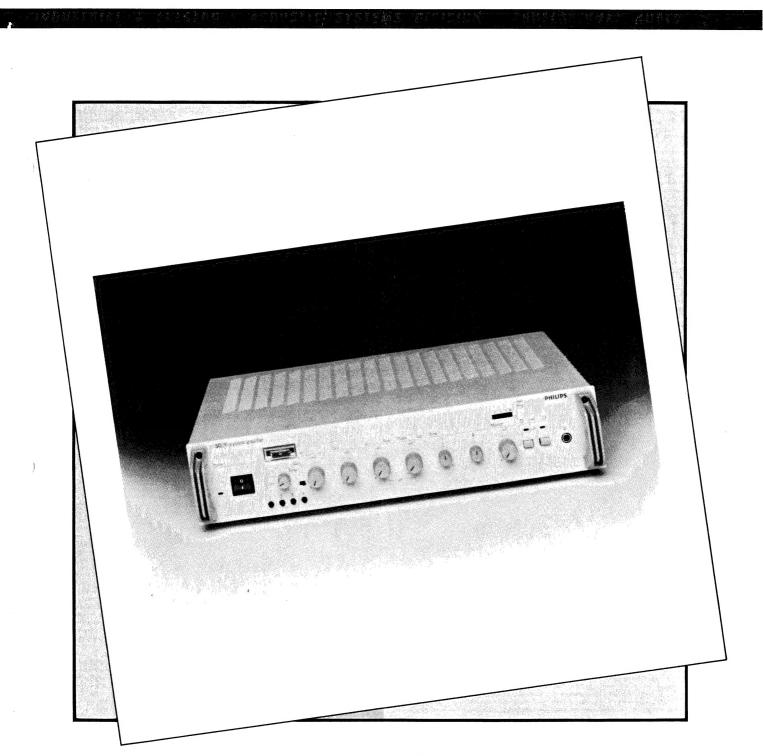


# **PHILIPS**

LBB 1231

SQ 20 AMPLIFIER - RANGE

Service Manual

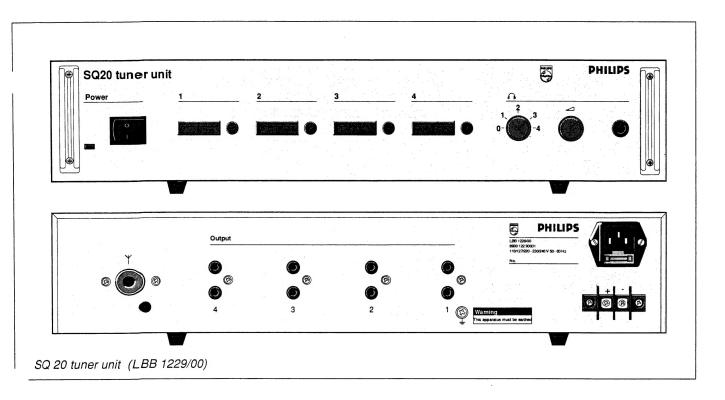


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Service I.P.G. Prof. Audio Public Address Systems Industrial & Electro-acoustic Systems Division Nederlandse Philips Bedrijven B.V.

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#### Technical data

110, 127, 220 V ±10% Mains supply and 230, 240 V +6/-10% 50 or 60 Hz 220-230 V At delivery +24 V -10/+20% DC supply (0 V grounded) 20 VĂ

Power consumption Outputs

Headphone output

3 V - output signal  $68 \Omega$ - output impedance Tuner outputs (4)

1 V ±1 dB - output signal - output impedance < 200  $\Omega$ 

FM tuner unit

87.5 to 108 MHz - frequency range 40 Hz to12 kHz ±2 dB - frequency response <= 4 µV at 26 dB signal-toensitivity noise ratio and 75 kHz

deviation

- signal-to-noise ratio at 40 kHz

>= 55 dB- aerial impedance  $75 \Omega$ 

Environmental conditions

- ambient temperature - storage temperature range

-40 to +70°C < 95% - relative humidity

Dimensions

- heiaht - width

88 mm (100 mm including feet) 440 mm (483 mm including 19" mounting brackets) 308 mm (348 mm including

rated range -10 to +45 °C

handles)

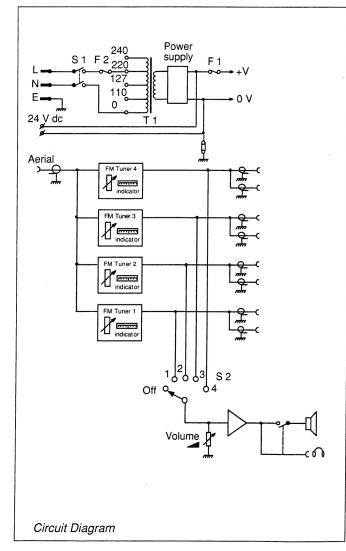
Weight

- depth

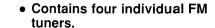
6 kg

according to IEC 65 and BS415 Safety

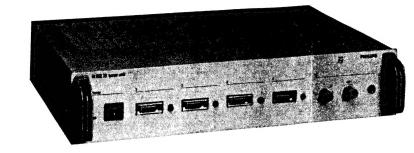
This product is manufactured to comply with the radio interferice requirements of the Council Directive of 87/308/EEC.



## SQ 20 Tuner unit LBB 1229/00



- Tuning range from 87.5 to 108 MHz.
- Suitable for table-top or 19" rack mounting.
- Matches SQ 20 amplifier series cabinets.
- Built-in monitor loudspeaker with volume control.
- Complies with international installation and safety regulations.



The Philips SQ 20 range of highperformance audio amplifiers and compatible system accessories has been designed to meet the most demanding professional public address requirements.

#### SQ 20 tuner unit

The LBB 1229/00 tuner unit contains four separate FM-tuners, and is an ideal music source for hospital and hotel public address systems offering a choice of channels to each individual listener. Each tuner can be independently tuned over the full FM range (87.5 to 108 MHz) and has a tuning indicator calibrated in MHz and preset potentiometer tuning knob mounted on the front panel.

The output sockets are mounted on the rear panel, (two cinch sockets per funer, although the output signal is mono), and a coaxial aerial socket is also included. Four screened stereo cables, each 1.5 m long and terminated at both ends with one red and one black cinch

connector, are supplied with the tuner unit for connecting outputs to a suitable booster amplifer.

## Monitor loudspeaker

A built-in monitor loudspeaker with volume control is provided on the front panel. A five-position switch is included to monitor each tuner in turn using the loudspeaker or via a headphone (a socket is provided which automatically disconnects the loudspeaker when the headphone is inserted). The monitor loudspeaker can also be used to provide music for the area where the system is installed, such as in a hotel reception.

#### Mains supply

The tuner unit can be connected to 110, 127, 220-230 or 240 V supplies (at 50 or 60 Hz) as the mains transformer has taps on the primary winding to allow for different line voltages. The transformer is thermally fused to prevent overheating. It is supplied wired for 220 V operation, and changes are made by resoldering

the connections to the appropriate transformer tags. The tuner unit can also be powered from a 24 V DC source. Both the mains and the DC supplies are fused. A 2 m long mains cable terminated at one end with an CEE plug and at the other with an earthed 2-pin mains plug is supplied.

## Mounting

Suitable for either table-top or 19" rack mounting, the tuner unit is ho used in a SQ 20 cabinet that matches all other elements in the range. The cabinet has non-corrosive anti-skid feet fitted. For rack mounting, the cover plate and feet must be removed and the unit is secured using two special mounting flanges (LBB 1239/00 - not supplied) -

## Safety

In common with all Philips products, care is taken to meet high safety standards. The SQ 20 tuner unit complies with the relevant safety and installatio n regulations of IEC 65 and BS 415.

> FIGURE 2.1 I BB 1229

This socket is also available for connecting other additional auxiliary equipment, such as a graphic equaliser.

.ll microphone channel input connectors including the interconnection socket are 5-pole 180° DIN-type sockets, mounted on the amplifiers rear panel.

Six double cinch type sockets also mounted on the amplifiers rear panel, provide the five, line level inputs, and tape/ cassette recorder output connections.

The outputs of the amplifiers, feeding their respective loud-speakers or groups of loudspeakers (not applicable to pre-mixing amplifier LBB 1230) are provided via an 'in-built' loudspeaker matching transformer.

The transformer provides a choice of three line level output voltages, 3V, 70V, 100V, this means that .arge groups of loudspeakers, covering long distances may be connected. An advantage of such an in-built facility is that the volume level of each loudspeaker, or groups of loudspeakers may be set individually.

Also included is an 8 Ohm low impedance output, this allows greater flexibility when choosing low ohmic loudspeakers.

The loudspeaker matching transformer's outputs are fed to their respective loudspeakers via a 'Mate-N-Lok' connector positioned at the rear of the amplifier, thus providing simpli-city in connecting loudspeakers.

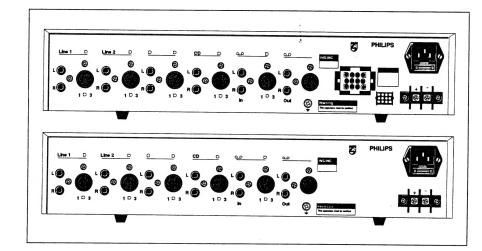
The front panel of the amplifiers contains easy to use rotary controls for the input sensitivity of each channel, and for both bass and treble tone adjustment of the amplified output signal. A master volume control, controls the overall gain level of the amplifier.

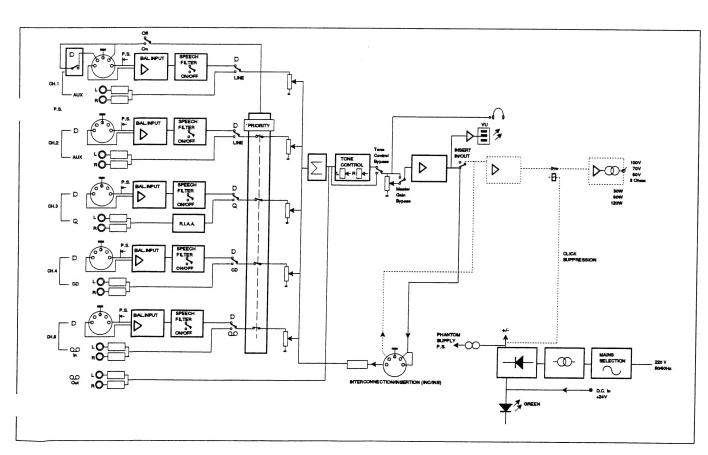
A front panel LED, located in close proximity to the mains switch, illuminates when the amplifier is powered up.

Indications for monitoring the amplifiers output power are provided by front panel mounted LED's.

The mains transformer may be tapped for different a.c mains voltages of 110V, 127V, 220-230V and 240V.

On delivery all amplifiers are supplied with a 2 m long mains lead terminated at one end with a 2-pole mains plug with earth contacts, and at the other end with a C.E.E mains connector.





# Mixing and Pre-Mixing Amplifiers



- P.A. amplifiers for table-top and 19" rack mounting.
- Balanced phantom supply audio inputs
- In-built matching transformer for loudspeakers with 100 V, 70 V, 50 V and 8 Ohm low ohmic tappings.
- Emergency external battery supply facility.
- Built-in monitoring facility with VU meter and headphone.

The SQ20 range of stand-alone public address 'high performance audio mixing, and pre-mixing amplifiers' has been designed to fulfil most professional public address requirements.

Due to their architectural design and high degree of versatility, they complement any tailored P.A. system; making them ideal for multizone projects requiring amplification for a variety of audio signals, simultaneously.

Ease of installation, together with excellent 'reliability' and service 'accessibility', have been optimized in their design.

The **SQ20** range of mixing and premixing amplifiers is available in a 30 watt, 60 watt, and 120 watt version, each offering its own advantage in fulfilling a variety of application needs.

The comprehensive range of **SQ20** mixing and pre-mixing amplifiers are available with the following type numbers:

- LBB 1230/00 Pre-Mixing
- LBB 1231/00 Mixing (30 watt)
- LBB 1232/00 Mixing (60 watt)
- LBB 1233/00 Mixing (120 watt)

Each amplifier includes 'five input

channels', each channel can be

pre-selected by means of internally mounted switches for use as 'microphone or line inputs'.
When used as microphone inputs, phantom power is available, thus allowing connection of both Philips

dynamic and BPE electret

microphones.
When used as 'line level' inputs, a variety of sound sources such as a tape or cassette recorder, tuner, compact disc player, or for a magneto-dynamic input such as a record player.

An additional feature included in the range of mixing and pre-mixing amplifiers is the option of selecting a 'priority microphone channel'. This feature, which when used with certain Philips microphones including a "priority" switch, allows an announcer to take priority, and mute all other sound sources currently being amplified.

An 'In-built' 'speech-filter' facility, selectable on all five channels, reduces the bass content of the amplified signal, thus all owing announcements and paging calls to be heard with greater clarity.

An 'Interconnection / Insertion' socket allows other SO2O mixing, pre-mixing and booster amplifiers to be connected should requirements change and the system needs to be expanded.

FIGURE 2.2 LBB 1230 - LBB 1232

## **TECHNICAL DATA**

(applicable to all amplifers unless otherwise stated)

Mains supply

: 110, 127, 220 V +/- 10%,

230 V & 240 V +6/-10% 50/60 Hz

The amplifier is delivered connected for 220 - 230 Volts A.C.

Battery supply

: + 24 V, ( 0 V grounded)

deviation -10 to +20%

**Power Consumption:** 

LBB 1230: 11 VA

**LBB 1231** : 110 VA **LBB 1232** : 176 VA

LBB 1233 : 352 VA

## Mixer Amplifier Pre - amp. section :

Microphone (Channel 1-2-3-4-5):

- balanced input with phantom supply : 12 V
- input sensitivity : 1.5mV
- input impedance : 1360 Ohm

- max.overload with 2% distortion : 25 dB

Priority channel 1, over channels 2 to 5

AUX. (Channel 1-2)

input sensitivity
input impedance
max. overload within 2% distortion
20 dB

Phono RIAA (Channel 3)

input sensitivity
 input impedance
 max. overload within 2% distortion
 2.5 mV
 47 kOhm
 10 dB

C.D. (Channel 4)

input sensitivity
 input impedance
 max. overload within 2% distortion
 360 mV
 47 kOhm
 15 dB

Tape in (Channel 5)

- input sensitivity : 120 mV - input impedance : 47 kOhm - max, overload within 2% distortion : 20 dB

Insertion

- input sensitivity : 1 V - input impedance : > 20 kOhm

Outputs:

Headphone

- output signal : 3 V - output impedance : 68 Ohm

Interconnection/Insert

- output signal : 1 V - output impedance : < 200 Ohm

- output short circuit protected

Tape Out

- output signal : 500 mV - output impedance : 3.3 kOhm

Frequency Response : 60 Hz to 18 kHz (+1 to -3 dB)
- speech filter response : -3 dB at 315 Hz (slope 6 dB/octave)

Distortion

- total harmonic distortion at rated

output voltage : < 0.5% (1 kHz)

**Tone Controls** 

- bass control : +/- 10 dB, at 100 Hz - treble control : +/- 10 dB, at 10 kHz

Signal/noise ratio :

measured with microphone input terminated with 200 Ohm resistor, phono input with 2 kOhm, AUX, tape and CD input with 2 kOhm:

- master volume control max, and all

volume control min. : 70 dB
- microphone control max. : 60 dB
- phono : 50 dB
- tape in : 60 dB
- CD : 60 dB

(measured between 20 Hz and 20 kHz flat)

#### **Output Power Section**

Interconnection/Insert

- input sensitivity : 1 V - input impedance: : 20 kOhm

LBB1231 LBB 1232 LBB 1233

15 watt 30 watt 60 watt

- rated output power

(mains)\*:

30 watt 60 watt 120 watt

rated output power (battery)\* :

Frequency Response:

\*) acc. IEC 268

- measured at 10 dB

below rated output power: within +1 to -3 dB between

60 Hz and 18 kHz.

Distortion:

- Total Harmonic Distortion (THD) at rated output power -20 dB at 1 kHz: <1%

Loudspeaker Outputs: (not applicable to LBB 1230/00)

Output Voltage	LBB 1231	LBB 1232	LBB 1233	
100 V	100 V	100 V	100 V	
70 V	70 V	70 V	70 V	
50 V	50 V	50 V	50 V	
8 Ohm output	15.5 V	22 V	31 V	

LBB 1231	LBB 1232	LBB 1233
333 Ohms	167 Ohms	83 Ohms
163 Ohms	82 Ohms	41 Ohms
83 Ohms	42 Ohms	22 Ohms
8 Ohms	8 Ohms	8 Ohms
	333 Ohms 163 Ohms 83 Ohms	333 Ohms 167 Ohms 163 Ohms 82 Ohms 83 Ohms 42 Ohms

## Signal-to-Noise Ratio :

- input connected with 2 kOhm: S/N > 80 dB between 20 Hz and 20 kHz flat.

LED VU.

- LED VU On:

- 20 dB +/- 6 dB green (w.r.t. rated output voltage)

- 20 dB +/- 6 dB green (w.r.t. rated output voltage - 6 dB +/- 3 dB green ( " " " " ) - 0 dB +/- 2 dB red ( " " " " ) Safety: : According to IEC 65 and BS 415

5.5 kg

**Environmental conditions:** 

- Operation temperature : - 10 to + 45°C - Storage temperature : - 40 to + 70°C - Relative humidity : 15 to 90%

Dimensions:

heigth: 100 mm

width: 440 mm. Including 19" brackets : 483 mm depth: 308 mm. Including handles : 348 mm

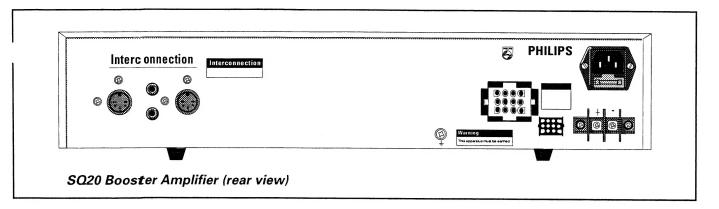
Weight: LBB 1230/00 LBB 1231/00

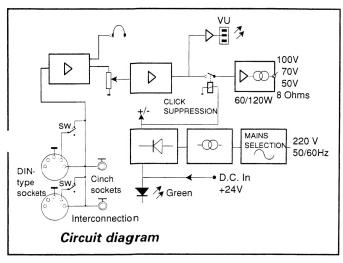
LBB 1232/00 LBB 1233/00

8.1 kg 9.1 kg

11.2 kg

This product is manufactured to comply with the radio interference requirements of the Council Directive of 87/308/EEC.





#### **TECHNICAL DATA**

Mains supply: 110, 127, 220 V +/- 10%,

230 V & 240 V +6/-10% 50/60 Hz

The amplifier is delivered connected for 220 - 230 Volts A.C.

Battery supply: + 24 V, (0 V grounded)

deviation -10 to +20%

**Power Consumption:** 

LBB1234/00: 176 VA

LBB1235/00: 352 VA

`outs

terconnection

- input sensitivity :

20 kOhm

- input impedance :

Outputs

LBB 1234/00

- Rated Output Power

(mains)\*

(battery)\*

60 watt 30 watt

120 watt 60 watt

LBB 1235/00

\* acc. IEC 268

Frequency Response

- Measured at 10 dB below rated output power: within +1 to -3 dB between 60 Hz and 18 kHz

- Total Harmonic Distortion (THD) at rated output power -20 dB at 1 kHz: <1%

#### **Loudspeaker Outputs**

Output Voltages	LBB 1234/00	LBB 1235/00
100 V	100 V	100 V
70 V	70 V	70 V
50 V	50 V	50 V
8 Ohm Output	22 V	31 V

Minimum Load	LBB 1234/00	LBB 1235/00	
100 V	167 Ohms	83 Ohms	
70 V	82 Ohms	41 Ohms	
50 V	42 Ohms	22 Ohms	
8 Ohm Output	8 Ohms	8 Ohms	

#### Signal-to-Noise Ratio

Input connected

with 2 kOhm: S/N >80 dB between 20 Hz and 20 kHz flat.

LED VU:

LED VU On: - 20 dB +/- 6 dB green

(w.r.t rated output voltage)

- 6 dB +/- 3 dB green

(w.r.t rated output voltage)

- 0 dB +/- 2 dB red

(w.r.t rated output voltage)

Safety:

According to IEC 65 and BS415

## **Environmental conditions**

- Operation temperature : -10 to +45°C

- Storage temperature : -40 to +70°C

- Relative humidity : 15 to 90 %

Dimensions: height: 100 mm

width: 440 mm. Including brackets: 483 mm

depth: 308 mm. Including brackets: 348 mm

Weight:

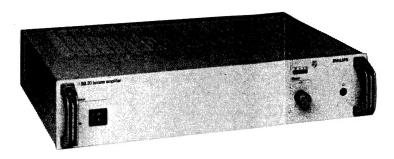
LBB 1234/00

LBB 1235/00

8.9 kg 11 kg

This product is manufactured to comply with the radio interference requirements of the council Directive of 87/308/EEC.

# Booster Amplifiers



The SQ20 range of stand-alone public address 'high performance booster amplifiers' has been designed to fulfil most professional public address requirements.

Ease of installation, together with excellent 'reliability' and service 'accessibility', have been optimized in their design.

The SQ20 range of booster amplifiers is available in a 60 watt, and a 120 watt version, each offering its own advantage in fulfilling a variety of application needs. Two 'interconnection' sockets allow other amplifiers in the SQ20 range to be connected. Such amplifiers include the range of high performance mixing and premixing amplifiers or should requirements change and the system needs expanding then additional booster amplifiers could be connected.

The outputs of the amplifiers, feeding their respective loudspeakers or groups of loudspeakers are provided via an inbuilt loudspeaker matching transformer.

The transformer provides a choice of three line level output voltages. 50 V, 70 V and 100 V, plus an 8 Ohm low ohmic output, this means that a large choice of loudspeakers. may be connected. An advantage of such an in-built facility is that the volume level of each loudspeaker, or group of loudspeakers may be set accordingly.

The loudspeaker matching transformer's outputs are fed to their respective loudspeakers via a 'Mate-N-Lok' connector positioned at the rear of the amplifier, thus providing simplicity in connecting loudspeakers.

- P.A. power amplifiers for table-top and 19" rack mounting.
- Matching transformer for loudspeakers with 100 V, 70 V , 50 V and 8 Ohm low ohmic tappings.
- Emergency external battery supply.
- Monitoring facility with VU meter and headphone.
- Interconnection facility.

A master volume control, controls the overall gain level of the amplifier.

A front panel LED, located in close proximity to the mains switch, illuminates when the amplifier is powered up.

Indications for monitoring the amplifiers output power are provided by front panel mounted

The mains transformer may be tapped for different ac mains voltages of 110 V, 12 V, 220-230 V and 240 V.

On delivery all amplifiers are supplied with a 2 m long mains lead terminated at one end with a 2-pole mains plug with earth contacts, and at the oher end with a C.E.E mains connegor.

Two mounting brackets (LBB 1239/ 00) and their associated screws may be supplied for 19" rack mounting purposes.

> FIGURE 2.3 LBB 1234 - LBB 1235

#### Speech filters

An "in-built" speech filter, available on all icrophone channels reduces the bass untent of the signal, allowing announcements and messages to be amplified with greater clarity.

#### Tape/cassette recorder connection

Facilities at the rear of the amplifier are provided for connecting a tape/cassette recorder" for playback and recording purposes. This feature provides a method of distributing the music of your choice, or to broadcast pre-recorded messages such as sale announcements for example.

#### In-built FM tuner

An important feature of the system amplifier is its in-built high quality FM tuner, providing a choice of four pre-set channels, each channel being tuned and preset by means of miniature tuning controls ated at the front of the amplifier.

A standard aerial socket is provided at the rear of the amplifier for connection to the FM tuner. A single cinch type socket provides an output connection from the FM tuner.

#### **External Music Input**

If required an external music source can be connected via the 100 V input of the MATE-N-LOK output connector. This facility is only available on loudspeaker zones 2 and 3.

The versatility of the system amplifier is such that if a call is active in one particular zone, the remaining loudspeaker zones to which the external music source is routed (applicable to zones Z2 and Z3 only) will not be muted in the event of a call.

#### Interconnection/Insertion

"interconnection/insertion"(INS/INC) socket allows other amplifiers in the SQ20 range to be connected should requirements change and the system needs to be expanded.

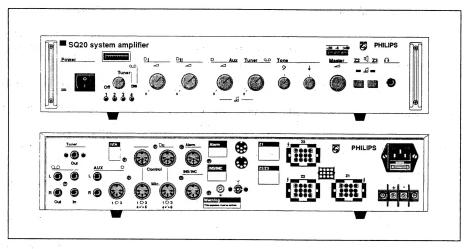
This socket is also available for connecting other additional auxilliary equipment, such as a graphic equaliser...for example.

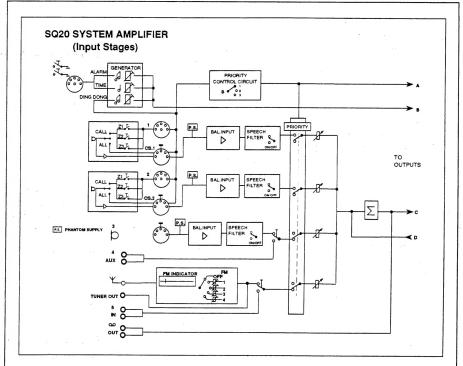
#### Alarm/Time

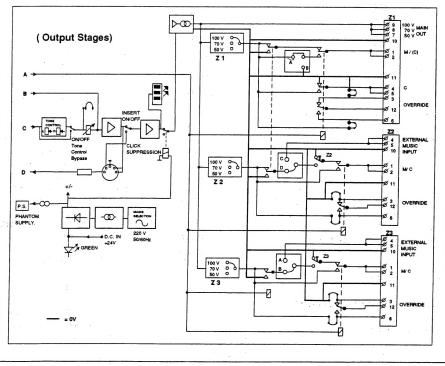
An in-built alarm/time circuit allows for the connection of an external alarm/clock push-button device connected via a 6-pole 240° DIN-type socket.

This feature is particulary useful whenever it is necessary to attract immediate attention, in an emergency for example. Pressing an alarm button will ensure that an alarm tone (twin-tone) notifies the listening public of the situation. Such a ravice will always take top priority.

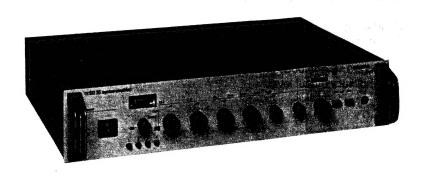
1-tone time signal (4-seconds), mixed with all other inputs can also be sounded giving warning to the listening public, giving warning when a workshop is about to close for example.







# SQ20 System Amplifiers LBB 1237/00, LBB 1238/00



The SQ20 range of 'high performance system amplifiers" has been designed to provide the user with a versatile, integrated stand-alone public address system. The amplifier includes 'loudspeaker zone routing facilities', and other vital system features each capable of fulfilling the wide variety of public address requirements.

They would typically be used in medium sized factories, garages, offices, supermarkets, shopping areas, schools and sport complexes etc..

Ease of operation combined with good service accessibility and reliability have been optimised in their design.

Due to their architectural design and high degree of versatility, they are ideal for use in multi-zone projects requiring amplification for a variety of audio signals, simultaneously.

The **SQ20** range of system amplifiers is available in a 60 watt, and a 120 watt version, each version providing the power handling capacity to meet virtually any system requirement.

The range of SQ20 system amplifiers is available with the following type numbers:

- LBB 1237/00 ( 60 Watt ) - LBB 1238/00 (120 Watt )

Each amplifier includes 'three microphone input channels', each supplied with phantom power. Two channels are for use with the Philips stand-alone "Call station" microphone, type number LBB 9427/10.

The third microphone input, switchable, is for use with either the wide range of Philips Dynamic or BPE microphones, or be used as an auxilliary line level input for connection to different sound sources, such as a tape/cassette recorder or similar background music source.

The user-friendly "Call station" microphone, LBB 9427/10 provides push-button facilities for 'routing announcements and messages' to selected loudspeaker zones, either individually or to all three loudspeaker zones collectively.

- High performance, integrated stand-alone public address system.
- Loudspeaker zone routing facilities to three loudspeaker zones, independently, or collectively
- Microphone priority facility providing one of three system operational modes.
- Audible in-built attention tone preceding a Call, plus alarm and time signal tones.
- Loudspeaker override facility for 3 and 4 wire systems.

This feature is particularly useful where a message must reach the staff only, and not the general public, as in a supermarket.. for example

#### **Attention Tone**

Preceding any call or announcement an audible attention tone willalert the listening public.

#### Microphone Priority

An in-built "microphone priority" facility provides the user with the option of assigning one of three system operational modes.

1. First -In First -Served.

The first call station user (ai ns access to the system.

2. Serial Priority.

Call station microphone No.1 is given priority over call station microp hone No.2.

3. Single Call Station

Call station No.1 has priorily over all other connected inputs, while call station No.2 is mixed with other connected inputs. Call station No.2 can be replated with a normal BPE or Dynamic michop hone.

FIGURE 2.4 LBB 1237 - LBB 1238

#### **Loudspeaker Outputs**

The loudspeaker outputs of the amplifier are provided via an output transformer, allowing connection to a wide range of loudspeakers. The outputs are connected via three Mate-N-Lok connectors, one per loudspeaker zone, each mounted on the amplifiers rear panel.

The outputs can be tapped per zone independently, at three different voltages. namely 50V, 70V and 100V, meaning that large groups of loudspeakers covering long distances can be connected.

#### **Override Facility**

An in-built override relay can be used to provide loudspeaker override facilties, using 3 and 4 wire systems. This means that all loudspeakers in the system, which include a volume control, can be activated (even if they are not turned on) so that emergency messages or announcements are broadcast at full power.

An additional feature of the override relay, is to trigger external functions, (...by Call signals to illuminate warning lamps in designated areas for example).

#### **System Amplifier Controls**

The front panel contains rotary controls for the input sensitivity of both call station input channels, the auxilliary/microphone channel, and the tuner/tape recorder channel. Similar controls adjust the bass and treble tone adjustment of the overall amplified signal.

A master volume control, controls the overall gain level of the amplifier. A front panel LED, located in close proximity to the mains switch, illuminates when the amplifier is powered up.

Two manual front panel zone selection buttons which if pressed directly route the chosen music source, to the selected loudspeaker zone. Indicators, indicate the chosen zone or zones selected.

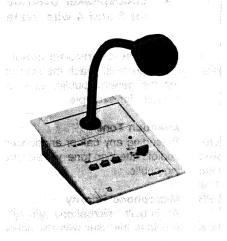
Headphones can be connected via a 6.3mm headphone socket for easy system monitoring, while three front panel LED's (-20,-6 and 0dB) give at a glance the amplifiers output level.

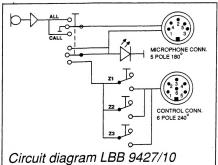
#### Power supply

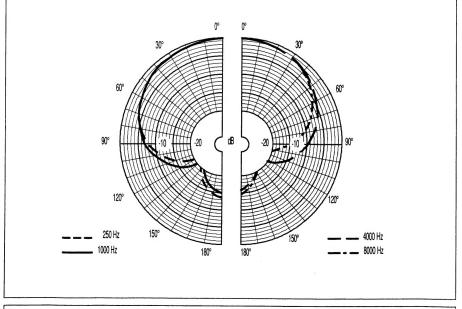
The SQ20 system amplifier, as well as being powered from the a.c mains can also be powered from an emergency battery supply of 24 volts d.c. The mains transformer can be tapped for different a.c mains voltages of 110V, 127V 220-230V and 240V.

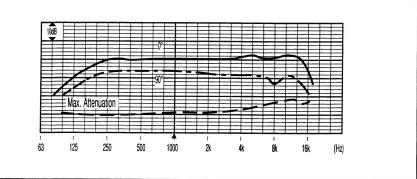
On delivery, all amplifiers are supplied with a 2m long mains lead terminated at one end with a 2-pole mains plug with earth contacts, and at the other end with a C.E.E. mains connector.

## Call Station Microphone LBB 9427/10









#### **TECHNICAL DATA**

110, 127, 220V +/- 10%, Mains supply

230V & 240V +6/-10% 50/60 Hz

The amplifier is delivered connected for 220 - 230 Volts A.C.

Battery supply : + 24 V, (0 V grounded) deviation -10 to +20%

Power consumption

LBB 1237/00 LBB 1238/00

: In-built FM tuner

: 55 dB

374 VA 187 VA

## Mixer Amplifier ( Pre -amp. section )

Microphone (Channel 1 -2 - 3):

- balanced input with phantom supply 12V 1.5mV input sensitivity 1360 Ohm input impedance max.overload with 2% distortion: 25 dB

Priority channel 1&2 over channels 3 & 4.

AUX. (Channel 3)

input sensitivity : 120 mV input impedance 47 kOhm - max. overload within 2% distortion 20 dB

Tape In. (Channel 4)

input sensitivity 120 mV 47 kOhm input impedance max. overload within 2% distortion 20 dB

FM Tuner Insertion

- input sensitivity : 1V : >20 kOhm input impedance

Chime Alarm and Tone signals - Chime (2-tone) via Call station 440 Hz ( 1 sec.) 555 Hz (0.5 sec.)

time signal 555 Hz (4 sec. const.)

alarm signal 440 Hz & 555 Hz (0.25 sec. constant)

Outputs Headphone

output signal ЗV output impedance 68 Ohm

Interconnection/Insert 1V output signal output impedance <200 Ohm

output short circuit protected

**Tape Out** 

- output signal 500 mV output impedance 3.3 kOhms **Tuner Out** 1V - output impedance <200 Ohms In-built FM Tuner

87.5 - 108 MHz - frequency range : 75 Ohm - aerial impedance - sensitivity at 26 dB S/N at 75 kHz dev. : 1 uV

**Frequency Response** 

60 Hz to 18 kHz (+1 to -3dB) at rated output power : - speech filter response : -3dB at 315Hz (slope 6dB/octave)

Distortion

- total harmonic distortion at rated

signal - to - noise at 40kHz dev.

output voltage : < 0.5% (1kHz) **Tone Controls** 

bass control

: +/- 10dB at 100Hz - treble control : +/- 10 dB at 10kHz

Signal/noise ratio:

measured with microphone input terminated with 200 Ohm resistor, phono input with 2 k Ohm, AUX, tape and CD input with 2 k Ohm:

- master volume control max. and all

volume control min : 70 dB 1 microphone control max : 60 dB - AUX : 60 dB : 60 dB - tane

(measured between 20Hz and 20 kHz flat)

#### **Booster Amplifier Section**

Inputs

Interconnection/Insert

- input sensitivity: 1٧

- input impedance 20 kOhm Outputs

LBB1237 LBB 1238 rated output power (mains) \* : 60 Watt 120 Watt - rated output power (battery)\* : 30 Watt 60 Watt

acc. IEC 268

Frequency Response: measured at 10 dB

below rated output power

within +1 to -3dB between 60 Hz and 18 kHz.

Distortion:

total harmonic distortion

at rated output voltage < 1%(1kHz)

Loudspeaker Outputs	Loudspeaker Outputs:				
Output Voltage 100, 70V, 50V	LBB 1237	LBB 1238			
Minimum Load					
100 V 70 V 50 V	167 Ohms 82 Ohms 42 Ohms	83 Ohms 41 Ohms 22 Ohms			

### Signal-to-Noise Ratio

 input connected with 2 kOhm:

S/N >80 dB between 20 Hz and 20 kHz flat.

LED VU. LED VU On: - 20 dB +/- 6 dB green

- 6 dB +/- 3 dB green 0 dB +/- 2 dB red

The above are w.r.t. rated output voltage.

According to IEC 65 and BS 415 Safety:

**Environmental Conditions:** 

 Operation temperature - 10 to + 45° C - 40 to + 70°C Storage temperature - Relative humidity 15 to 90%

Dimensions:

Weight:

: H x W x D: 100 x 440 x 308

width including 19" brackets: 483 mm depth including handles:

LBB 1237/00 LBB 1238/00

9.8 kg

Call Station Microphone LBB 9427/10

Description: table-stand microphone with 3-position switch

Off, "ALL Call" and "Call", plus LED indication On and busy. Three push-buttonsfor selection d 3 loudspeaker zones, individually or collectively.

 transducer BPE conde inser

polar pattern Hypercardioid freg.range (acc. to IEC 268-4) 180 - 12.80 O Hz at -3dB

145 - 13,80 O Hz at -6dB - sensitivity (acc. to IEC 268-4) 2.8 mV/P<sub>2</sub> -+/- 3 dB (-51 dB re. to 1 V/Pa)

Max. SPL for THD <3% 134 dB Rated output impedance <200 Ohn Load impedance > 600 Ohm 19 dB(A)

Equivalent input noise level Phantom power supply

11 - 52 V (acc. to DIN 45596 and IEC 268 - 15A)

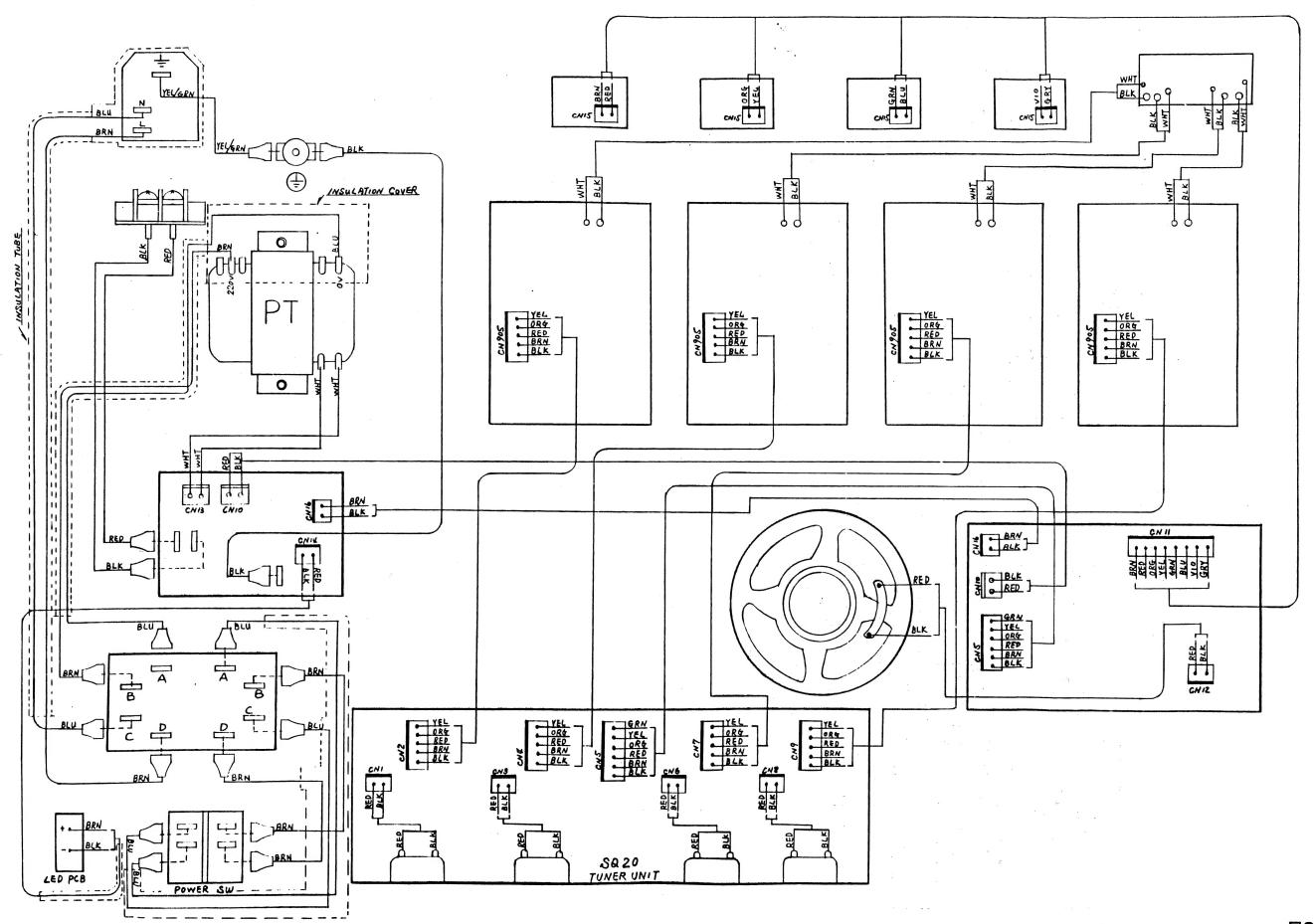
Current consumption < 5 mA - Ambient temperature range -10°C to +5∙5°C

Ambient rel. humidity 80% max.a t 20°C

- Cable 2-core + 2core screened, 3m & 5 co;€, 3m

 Connector 5-pole 18@ DIN-plug 6-pole 240 DIN-plug weiaht : 0.87 kg (ipl. cable)

These product are manufactured to comply with the radio interference requirements of the Council Directive of 87/308/



Service Documentation 4822 733 24416

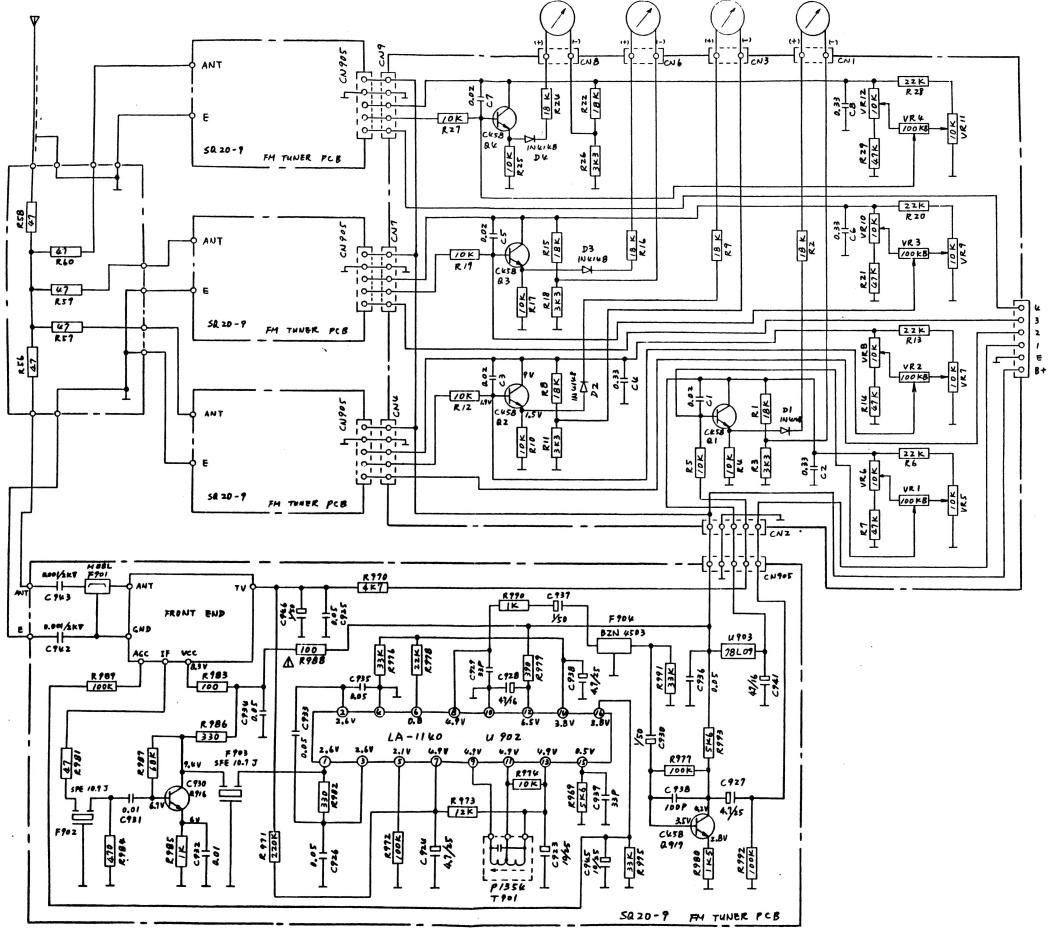
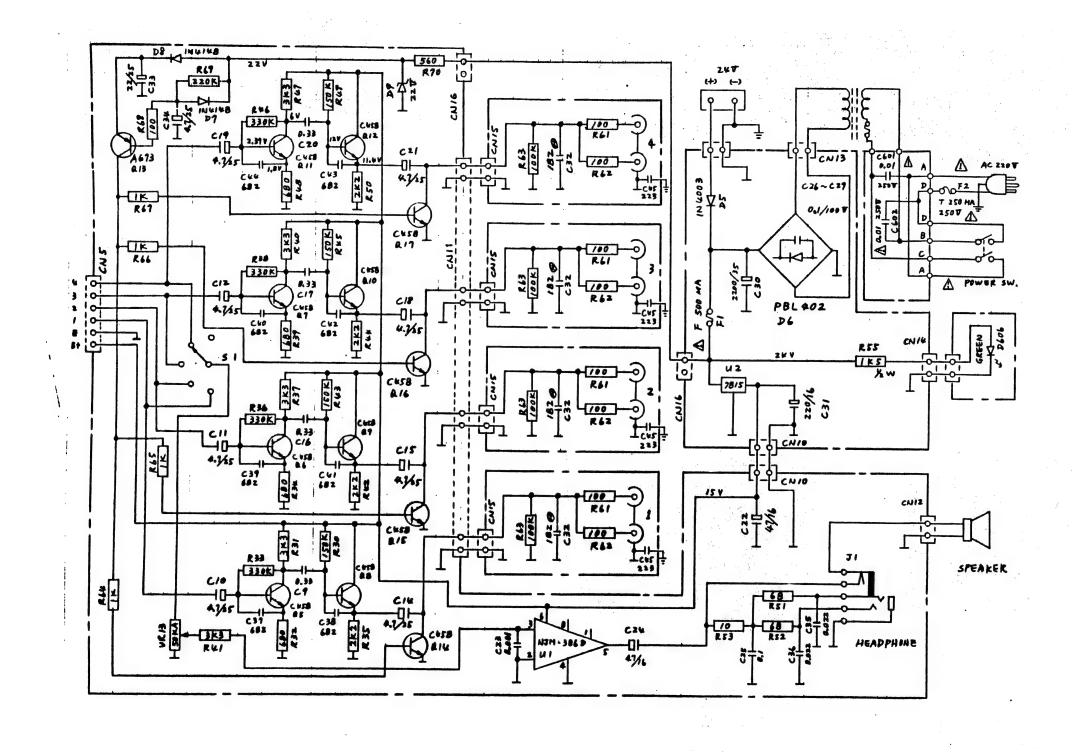
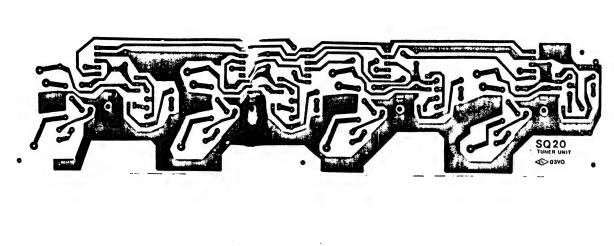
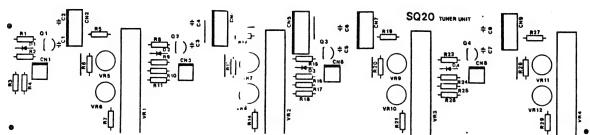
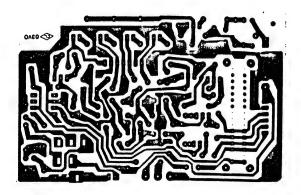


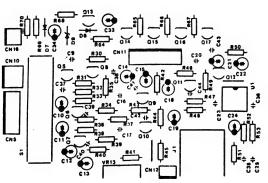
FIGURE 7.2 LBB 1229 CIRCUIT DIAGRAM PART 1

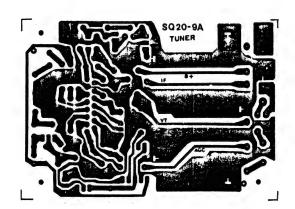


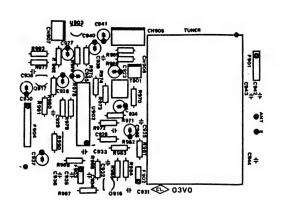


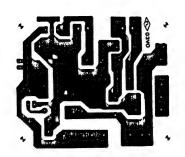








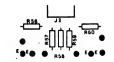


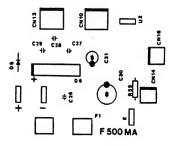








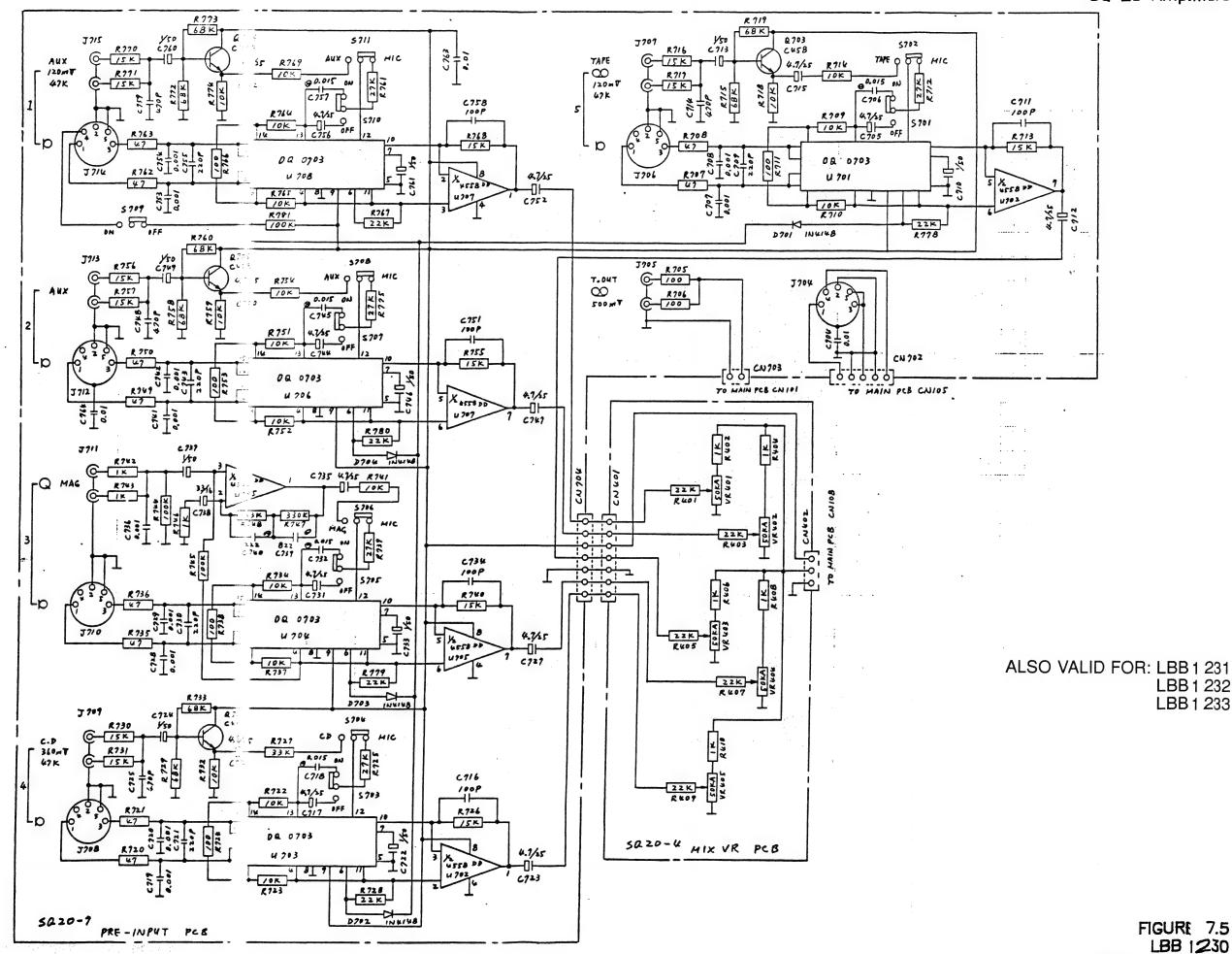


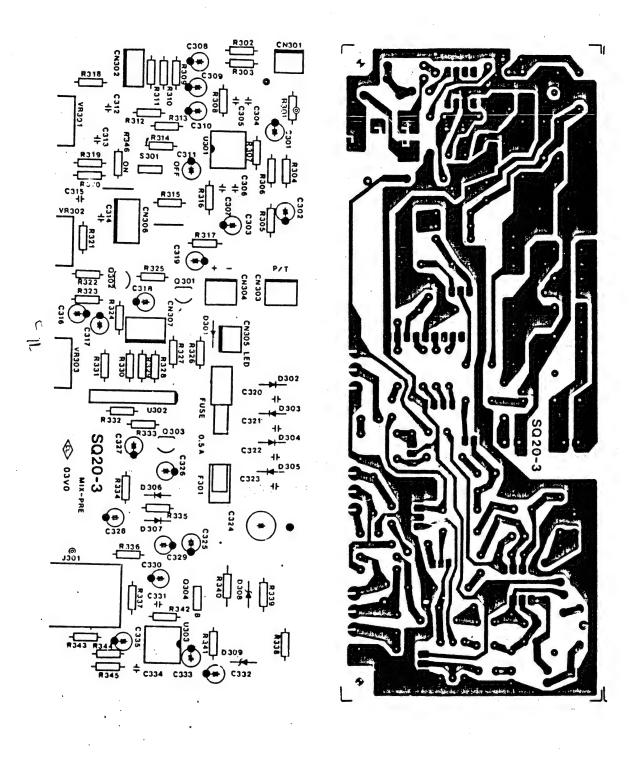


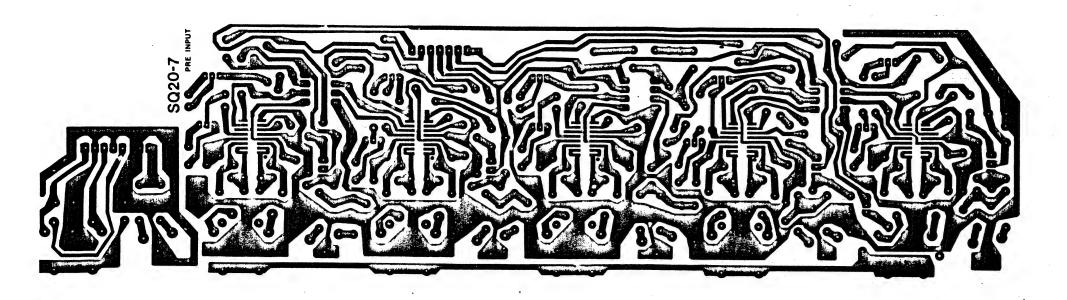




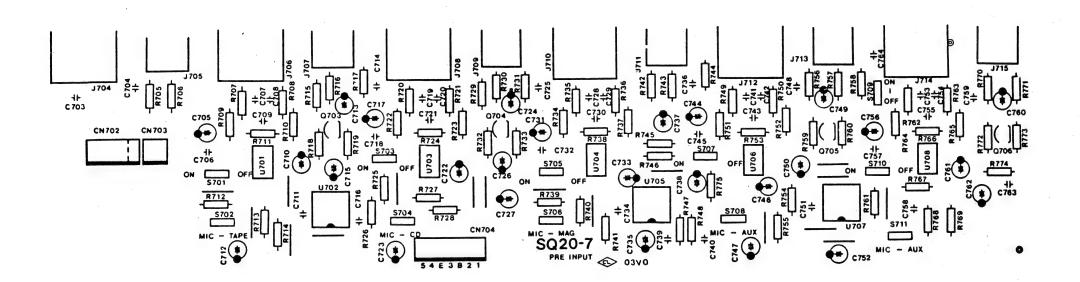
CIRCUIT DIAGRAM

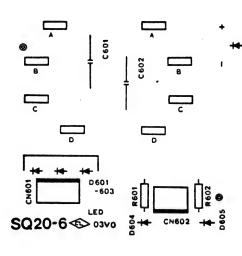


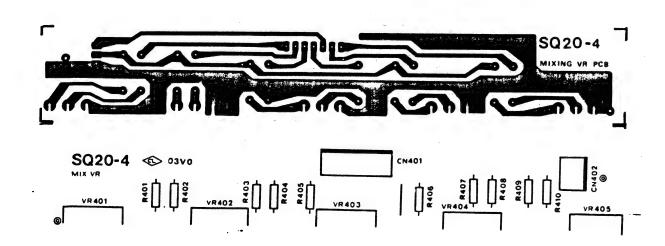












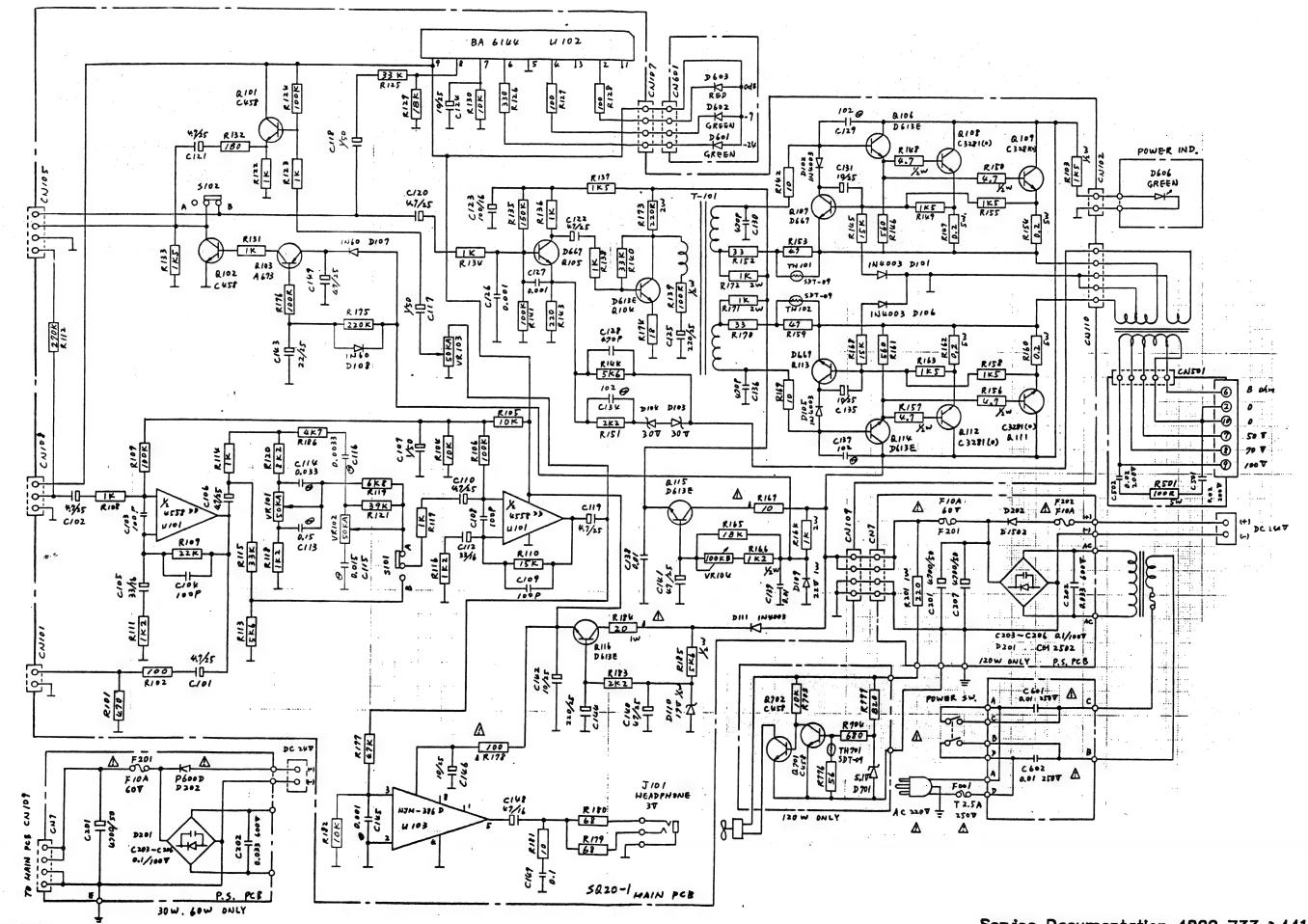
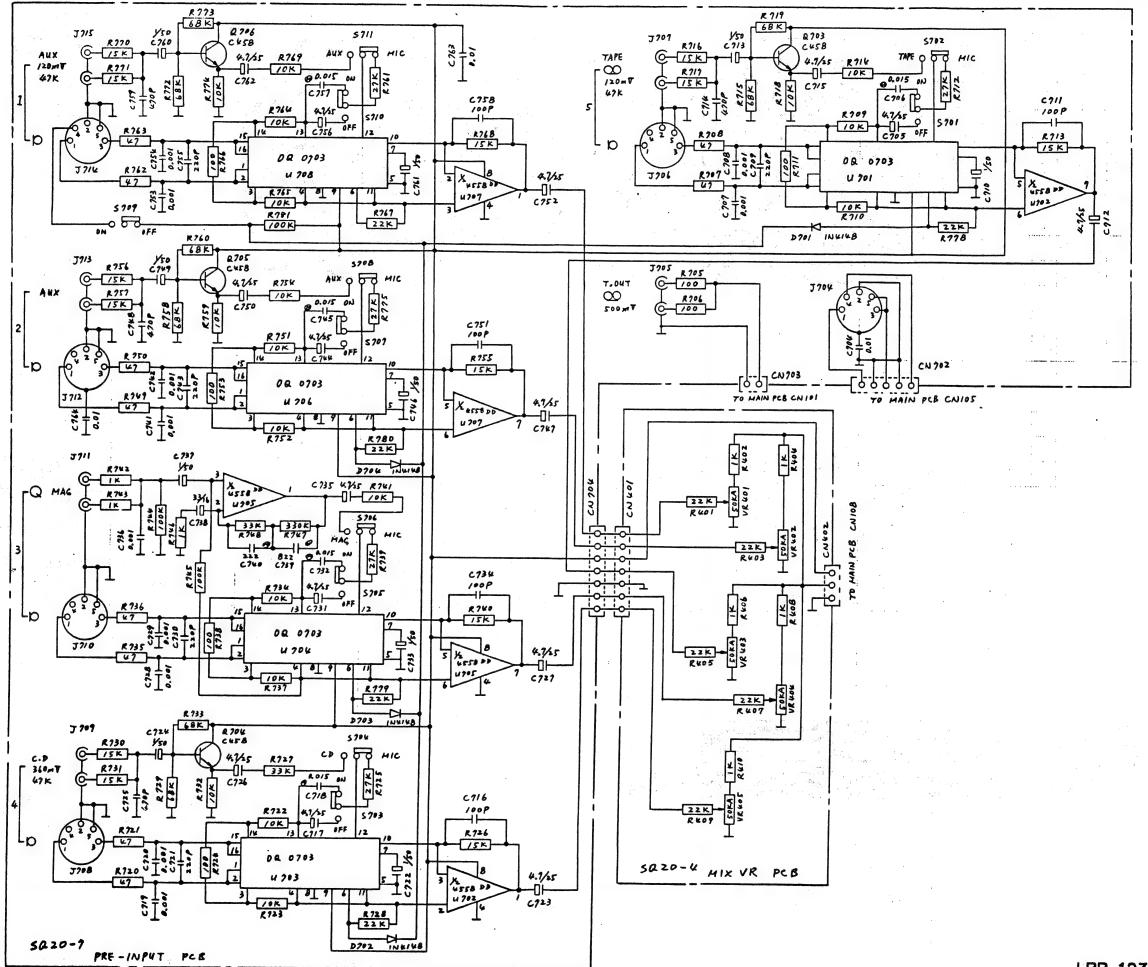
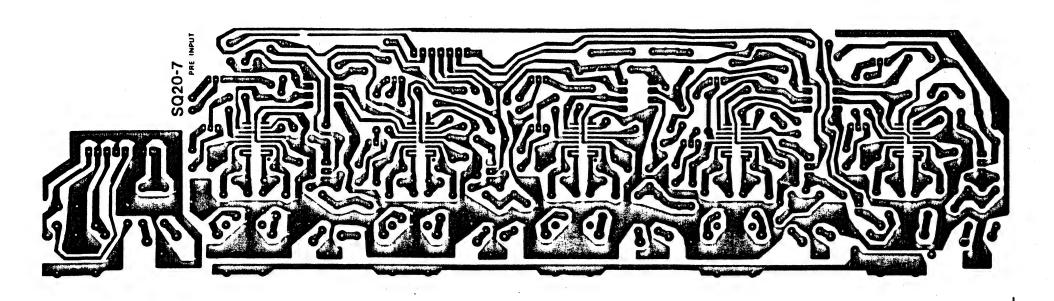
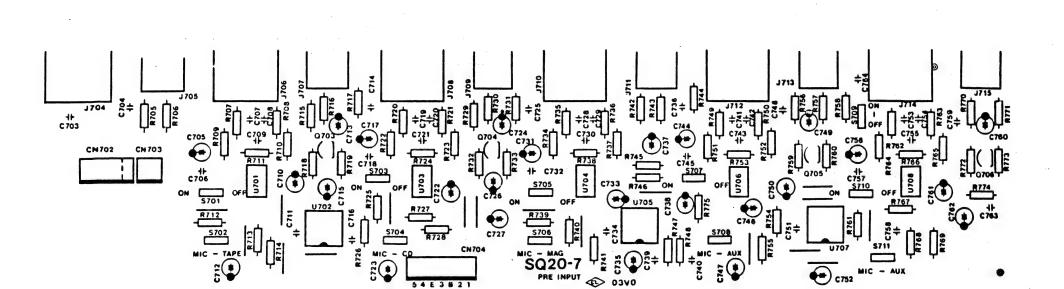


FIGURE 7.8 LBB 1231/1232/1233 CIRCUIT DIAGRAM PART 1 Service Documentation 4822 733 24416



SQ20-5





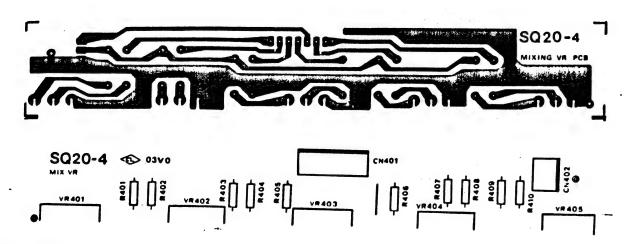
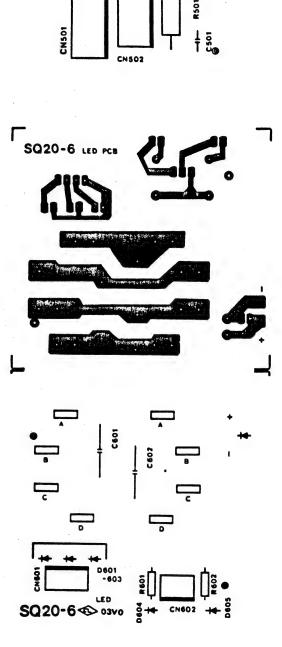
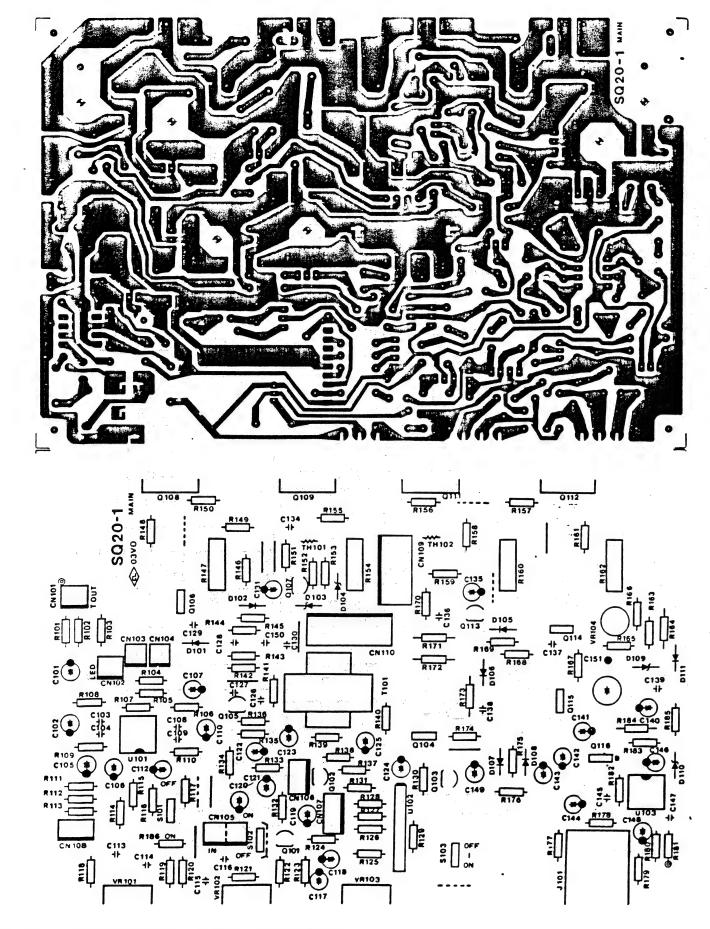
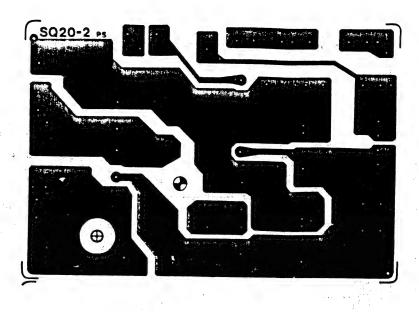


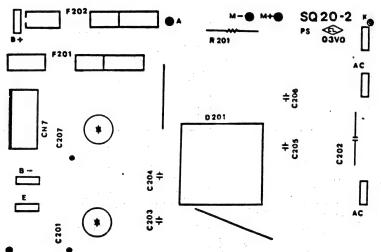
FIGURE 7.10 LBB 1231/1232/1233 PCB LAY-OUT PART 1

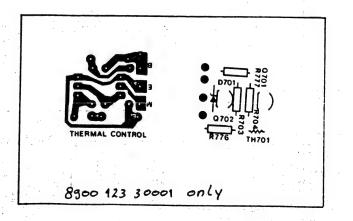


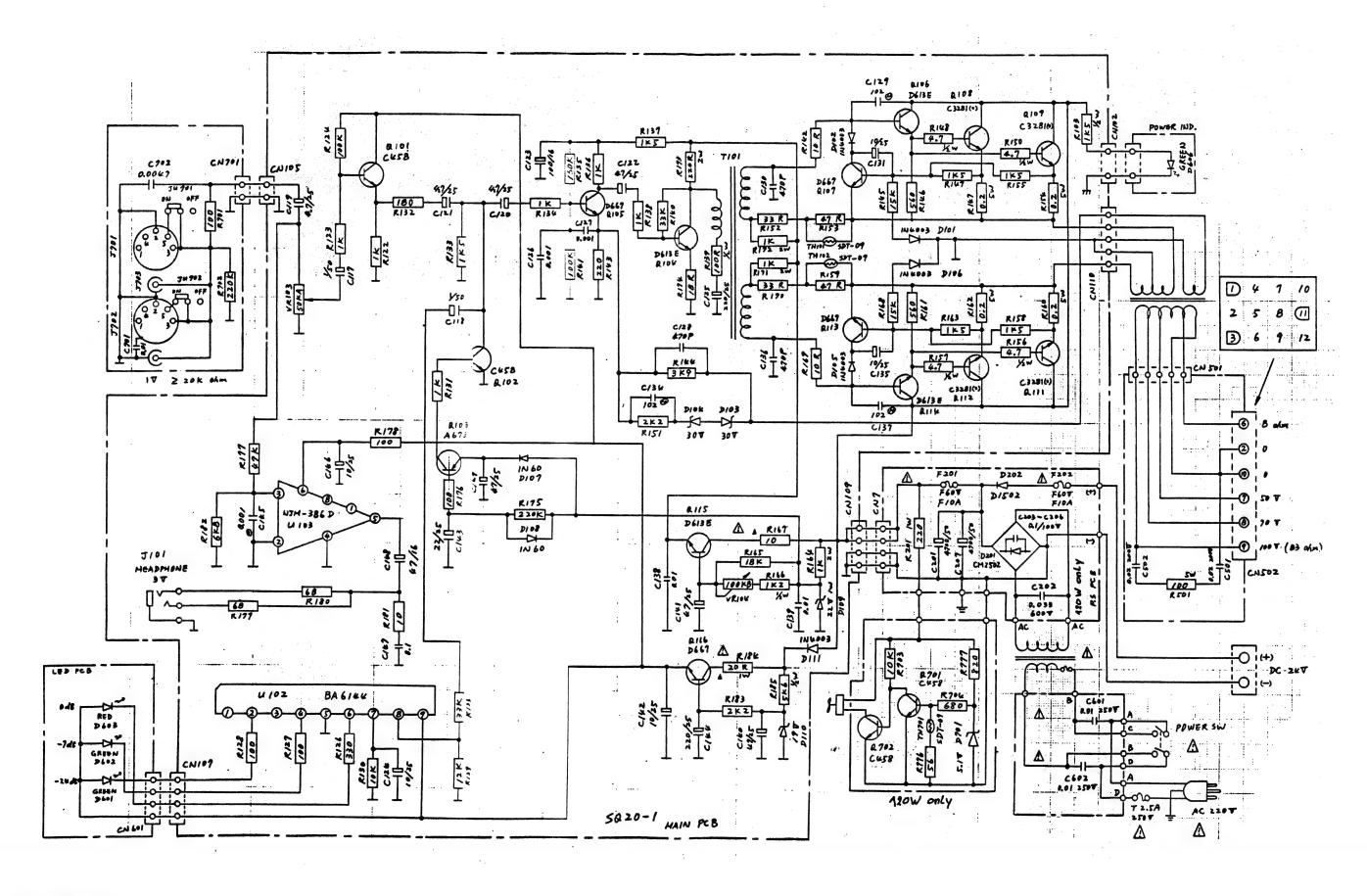
SQ20-5 OUTPUT

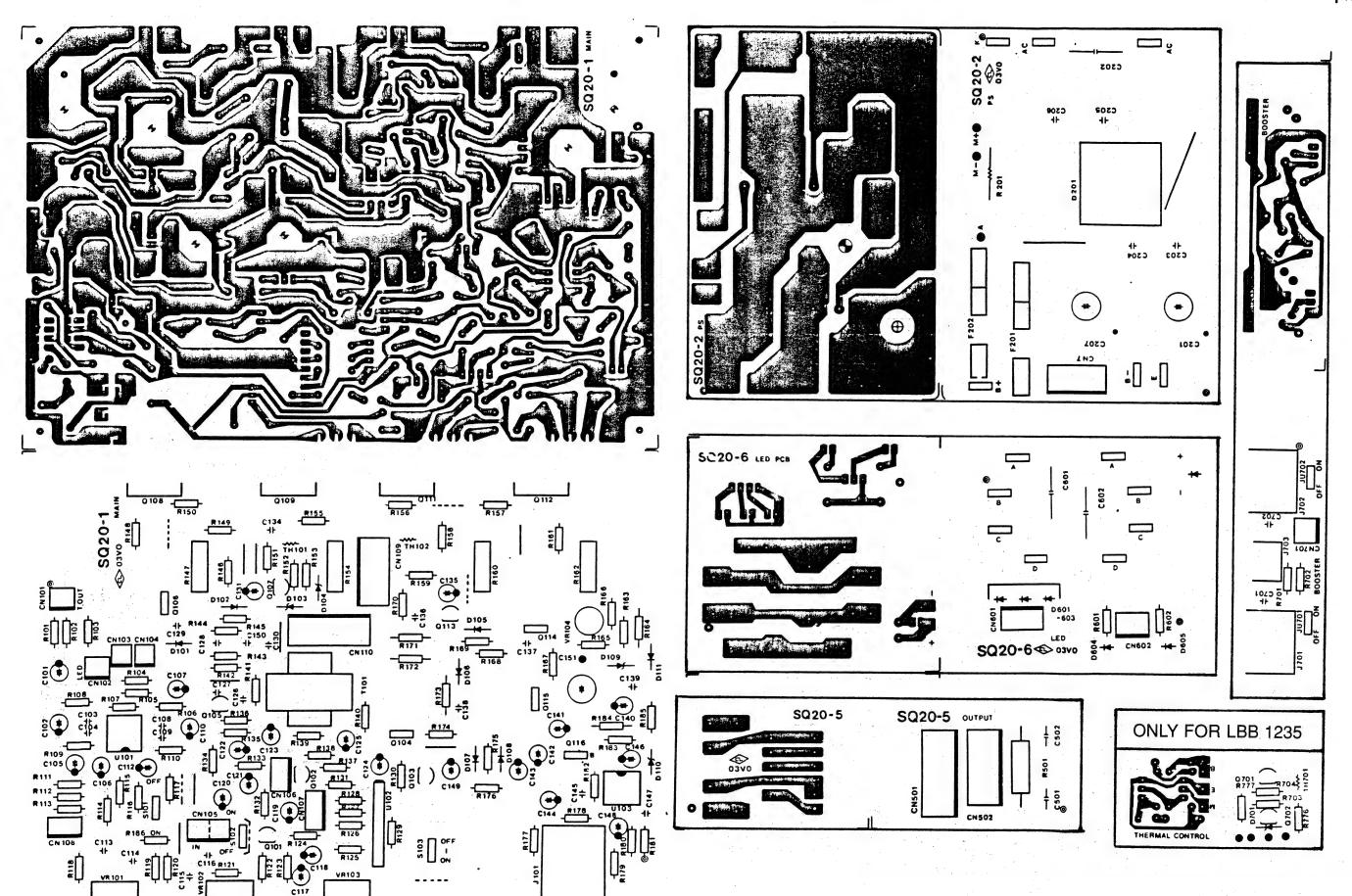


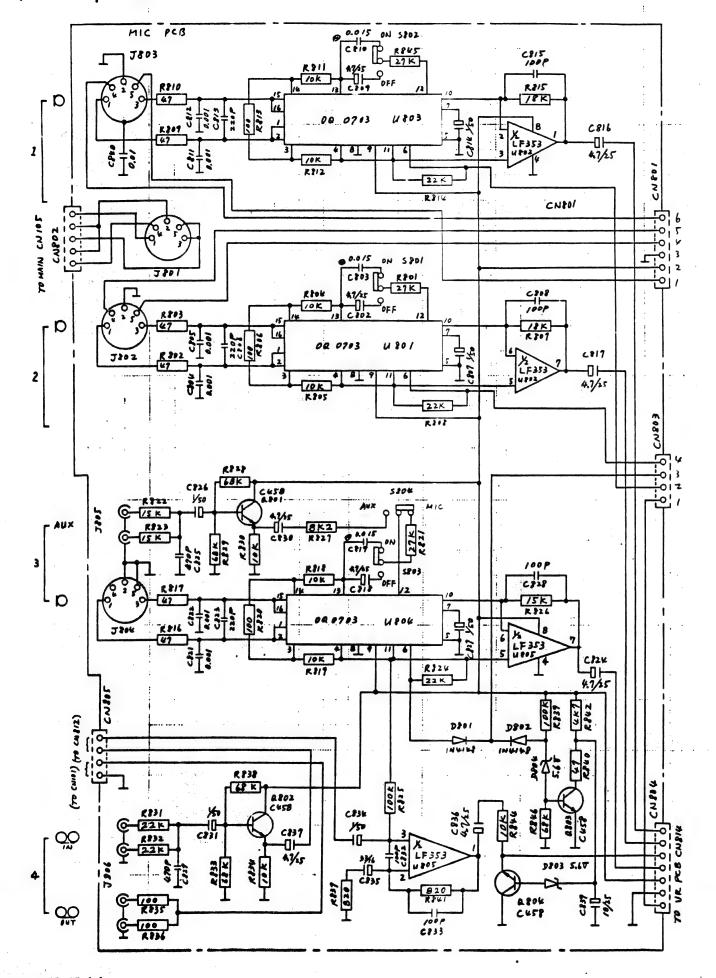


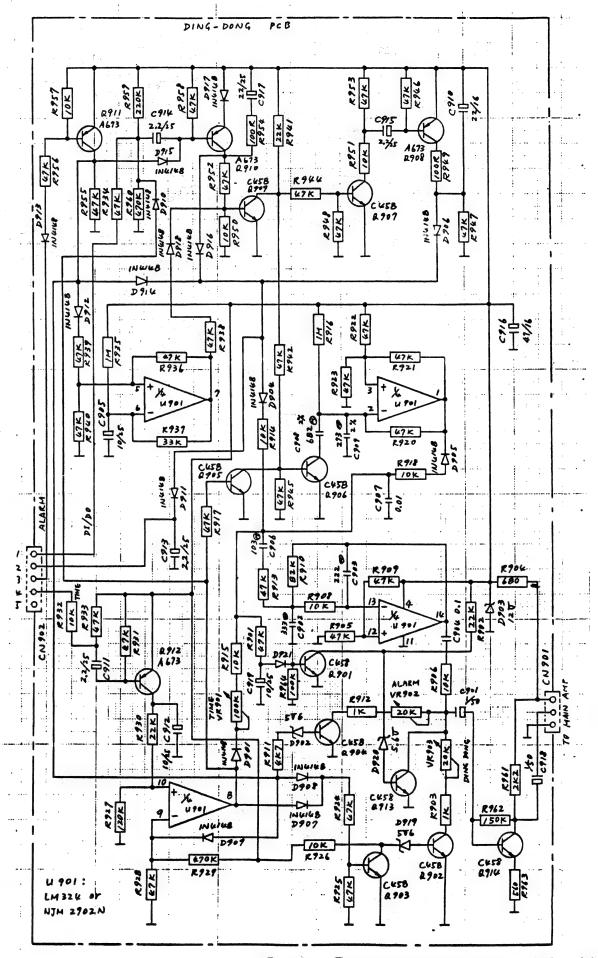






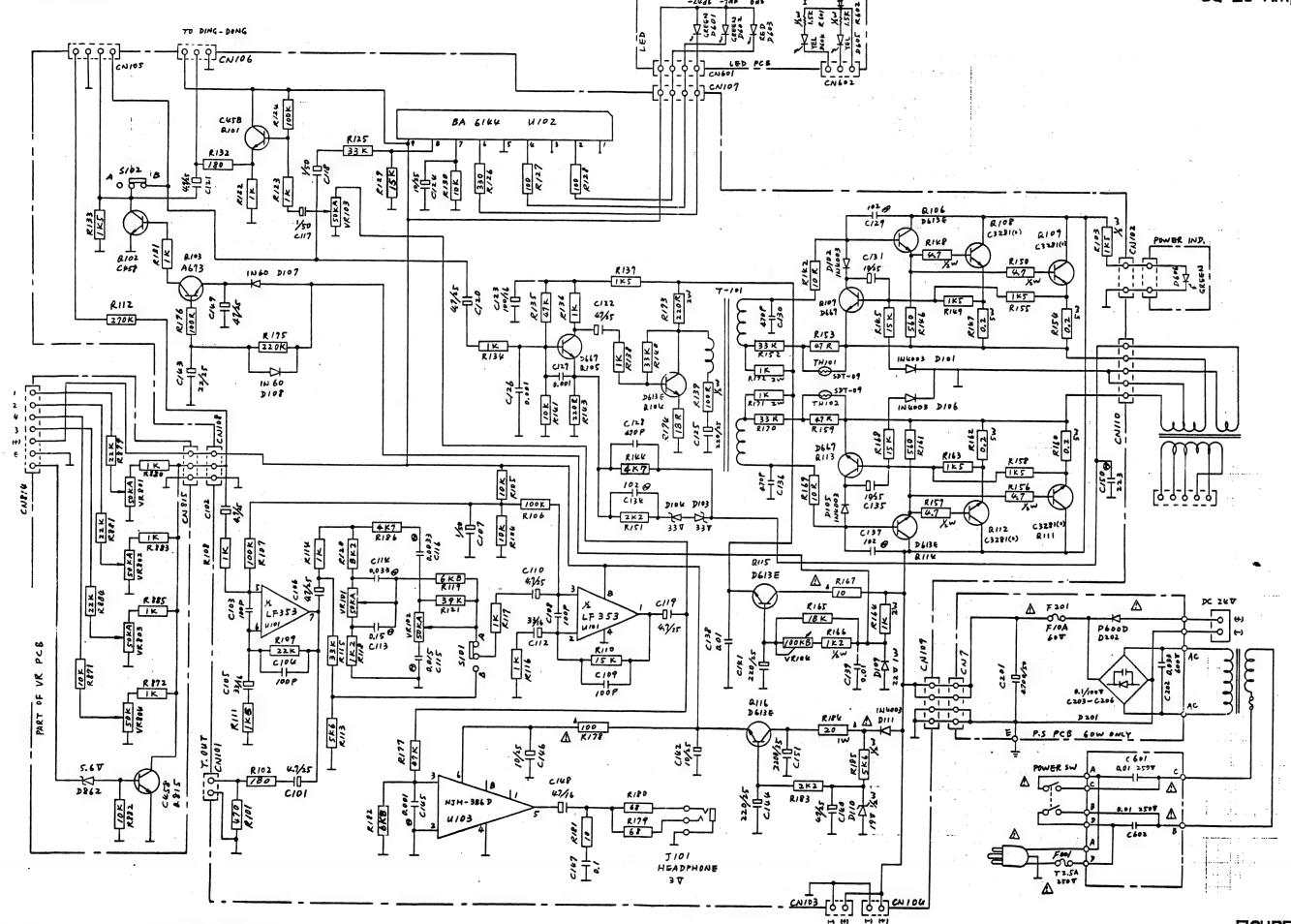


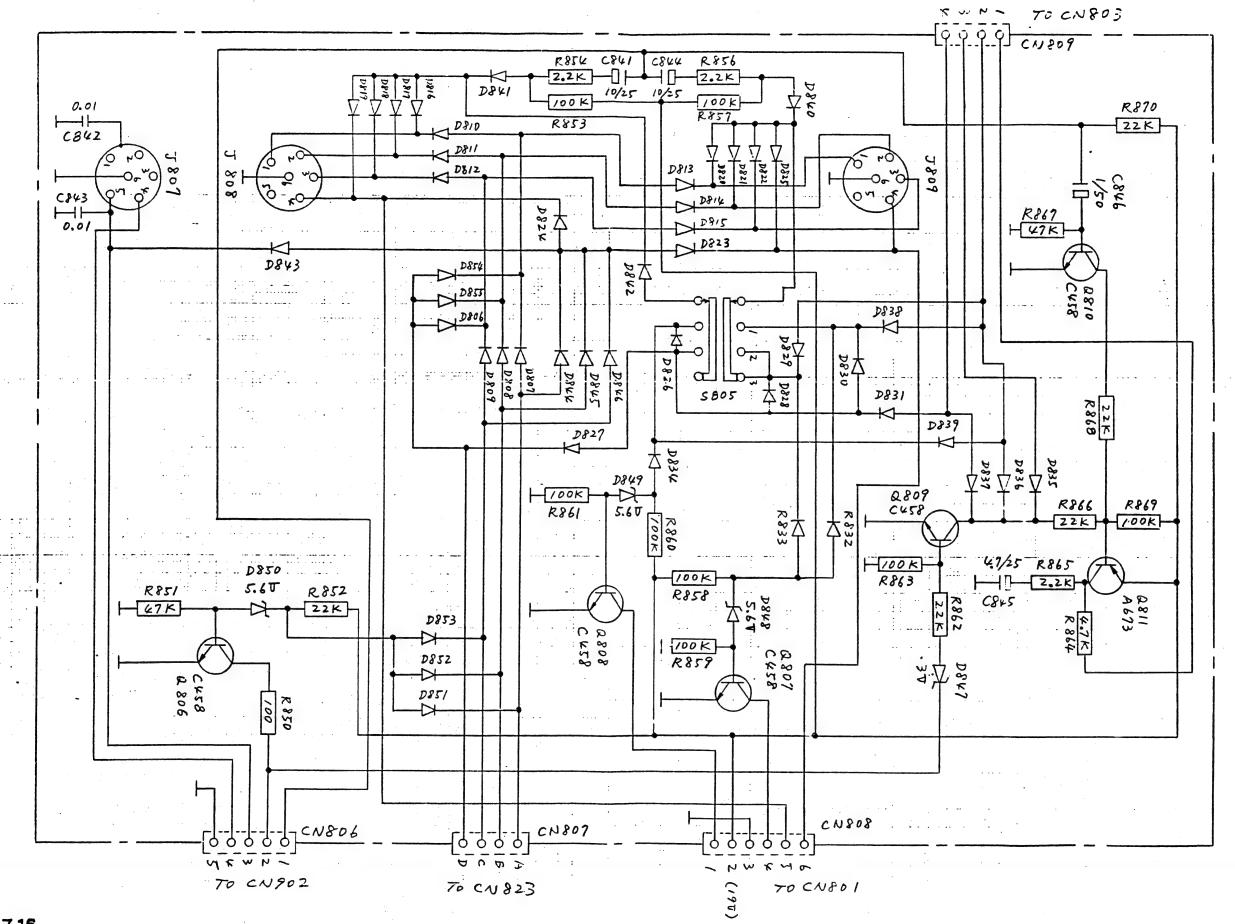


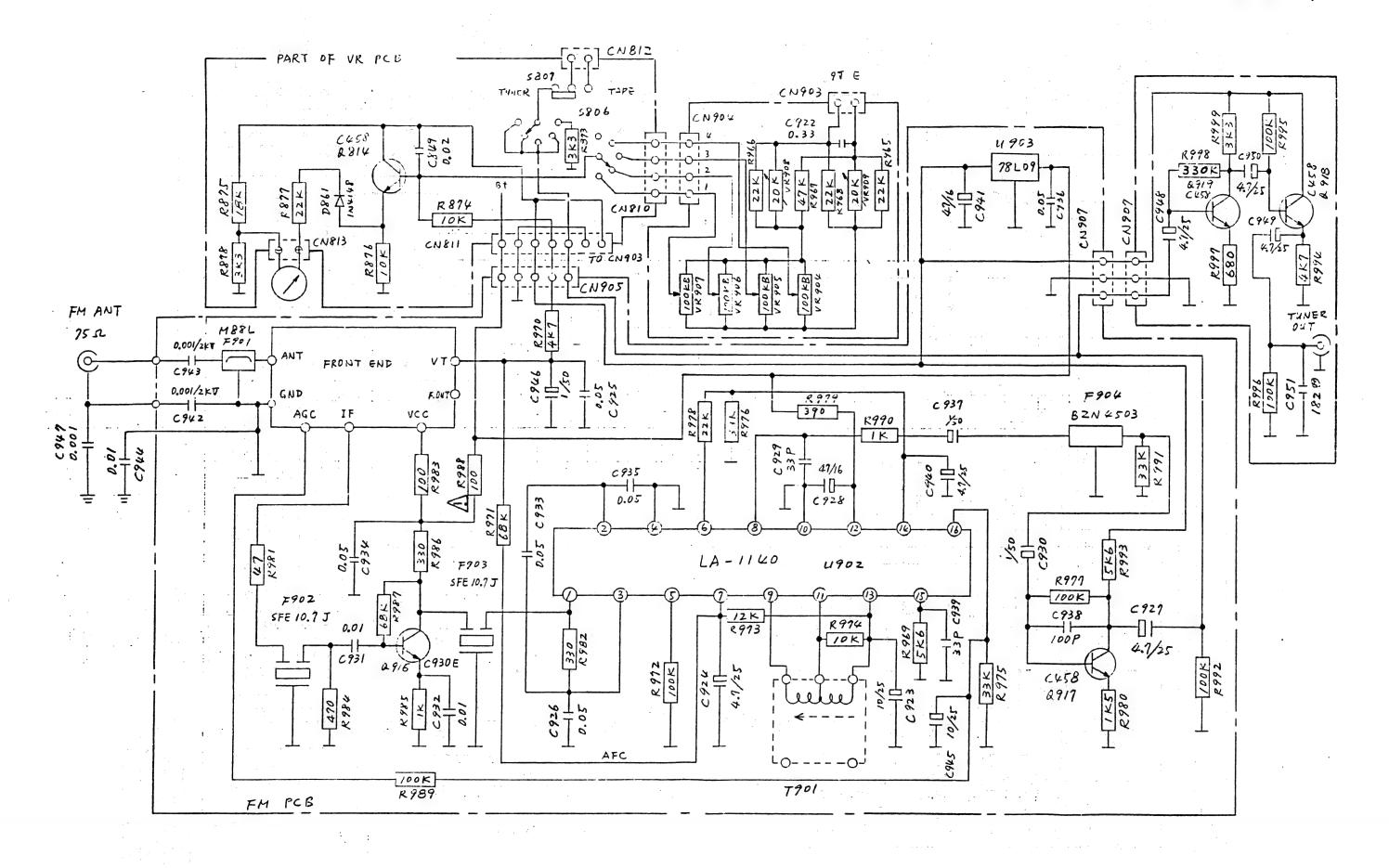


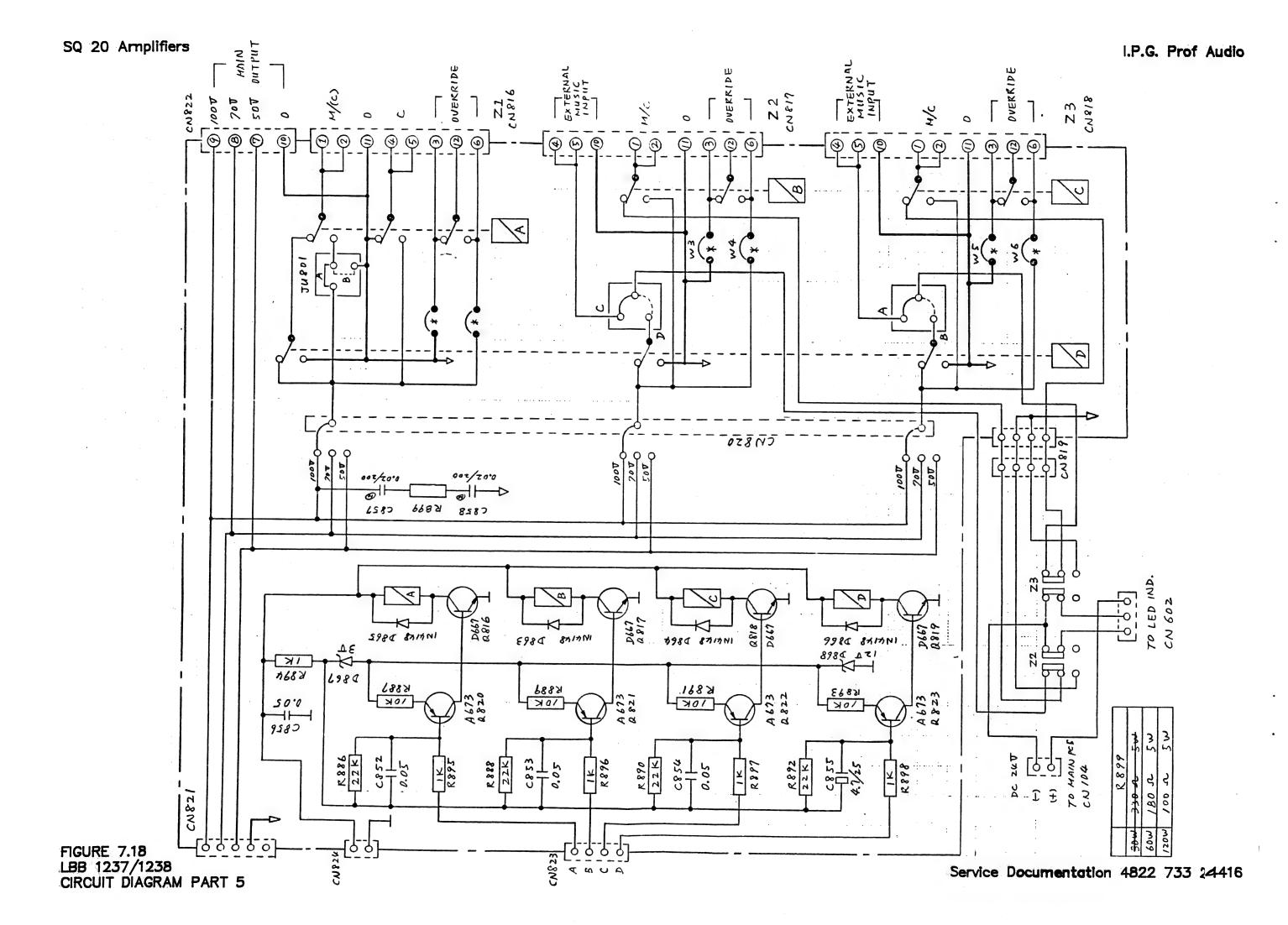
Service Documentation 4822 733 2 4416

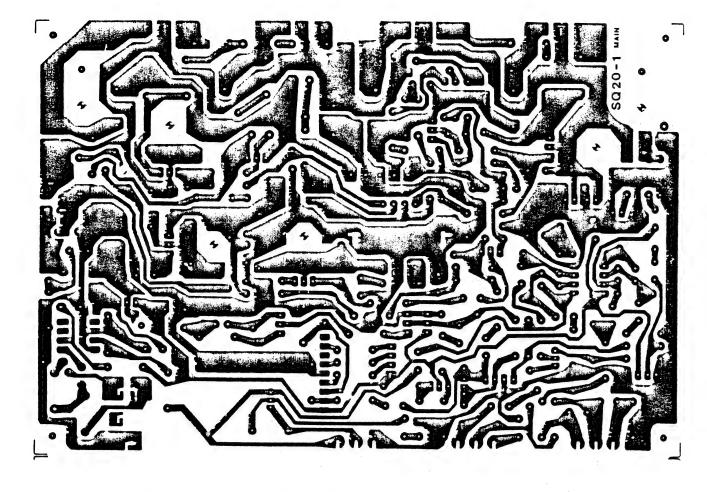


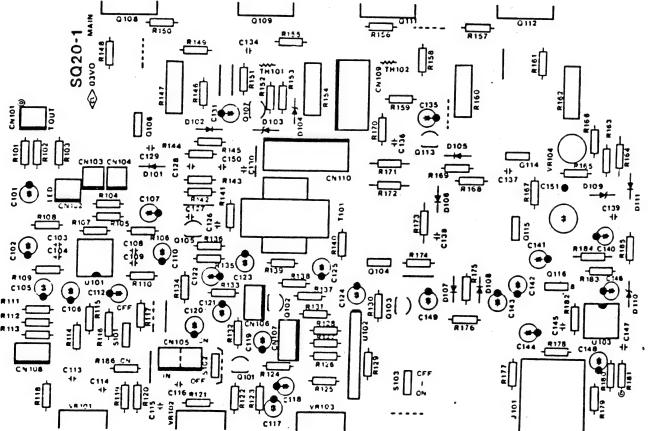


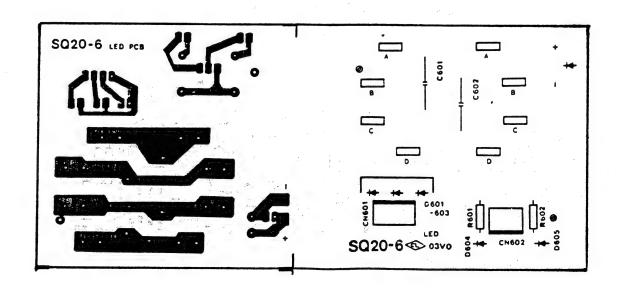


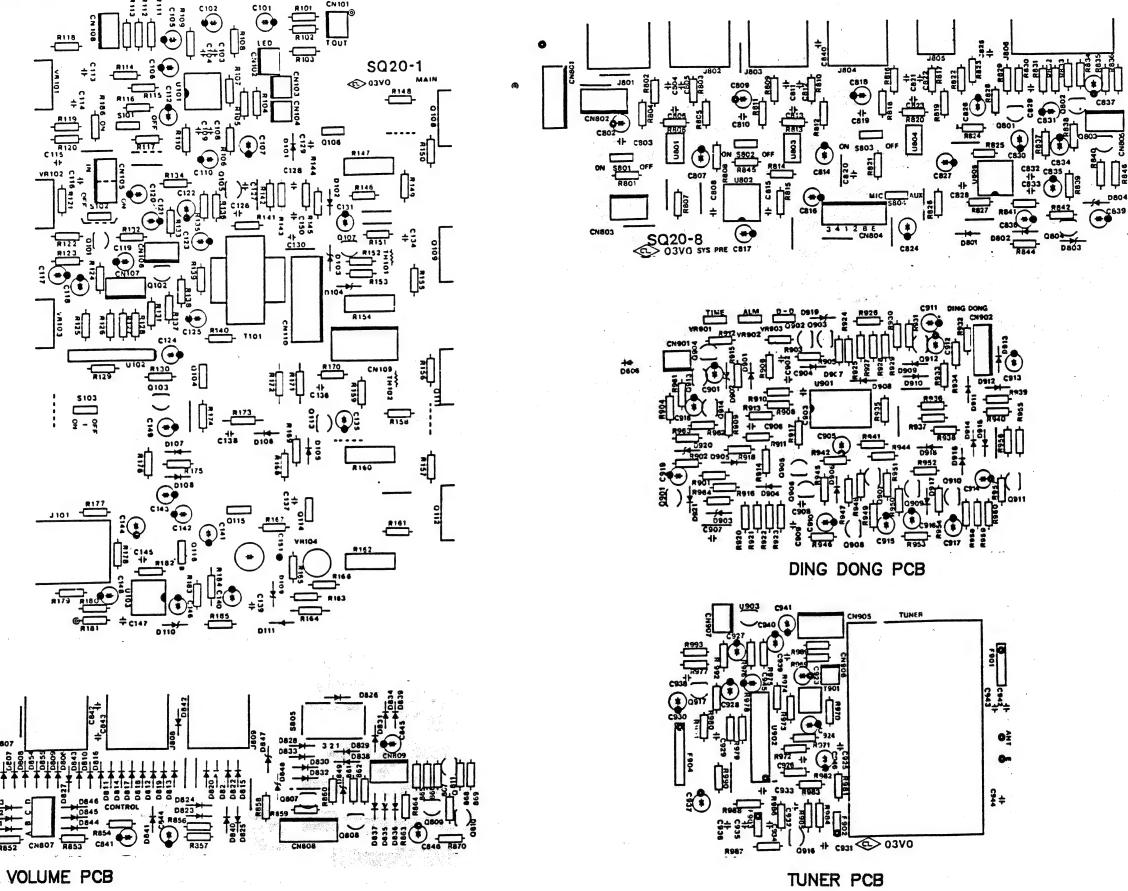


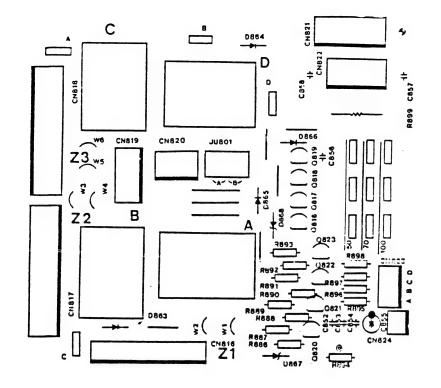


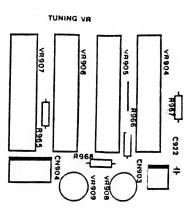






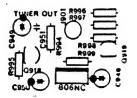




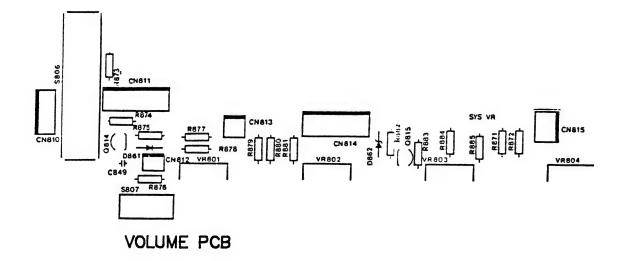


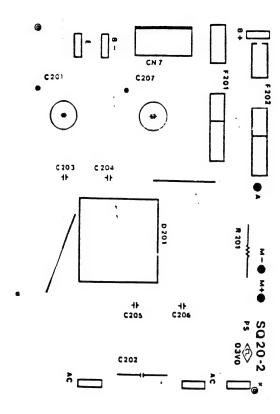
TUNER VR PCB

RELAIS PCB



TUNER-OUT PCB









ONLY VALID FOR LBB 1238

## CONTENTS

## CHAPTER DESCRIPTION

		PAGE
1	INTRODUCTION	3
1.1	GENERAL	3
1.2	THE SQ20 AMPLIFIER RANGE	4
2	TECHNICAL DATA	4
3	INSTALLATION INSTRUCTIONS	4
4	CHECKING AND ADJUSTING	6
5	CIRCUIT DESCRIPTION	7
5.1	DIFFERENCE BETWEEN THE SEVERAL OUTPUT-STAGE'S	7
6	SPARE PARTS	8
6.1	RECOMMENDED SPARE-PARTS TOTAL SQ 20 SERIES	9
6.2	SPARE-PARTS, LISTED PER TYPE-NUMBERS	
6.2.1 6.2.2 6.2.3 6.2.4 6.2.5 6.2.6 6.2.7 6.2.8	LBB 1229/00 LBB 1230/00 LBB 1231/00 LBB 1232/00 LBB 1233/00 LBB 1234/00 LBB 1235/00 LBB 1237/00	10 11 12 13 14 15 16
6.2.9	LBB 1238/00	18

4822 733 24416

SERVICE DOCUMENTATION

## CONTENTS (cont'd)

7	DRAWINGS (CONTENTS (CONT'd)
	FIGURE: (as appendix)
7.1	LBB 1229/00 WIRING-DIAGRAM
7.2	LBB 1229/00 CIRCUIT-DIAGRAM \PART1
7.3	LBB 1229/00 CIRCUIT-DIAGRAM \PART2
7.4	LBB 1229/00 PRINTED CIRCUIT BOARD LAY-OUT
7.5	LBB 1230/00 CIRCUIT DIAGRAM
7.6	LBB 1230/00 PRINTED CIRCUIT BOARD LAY-OUT
7.7	LBB 1230/00 PRINTED CIRCUIT BOARD LAY-OUT
7.8	LBB 1231/00, -1232/00, -1233/00 CIRCUIT DIAGRAM \PART1
7.9	LBB 1231/00, -1232/00, -1233/00 CIRCUIT DIAGRAM \PART2
7.10	LBB 1231/00, LBB 1232/00, LBB 1233/00 PCB LAY-OUT \PART1
7.11	LBB 1231/00, LBB 1232/00, LBB 1233/00 PCB LAY-OUT \PART2
7.12	LBB 1234/00, LBB 1235/00 CIRCUIT DIAGRAM
7.13	LBB 1234/00, LBB 1235/00 PCB LAY-OUT
7.14	LBB 1237/00, LBB 1238/00 CIRCUIT DIAGRAM \PART1
7.15	LBB 1237/00, LBB 1238/00 CIRCUIT DIAGRAM \PART2
7.16	LBB 1237/00, LBB 1238/00 CIRCUIT DIAGRAM \PART3
7.17	LBB 1237/00, LBB 1238/00 CIRCUIT DIAGRAM \PART4
7.18	LBB 1237/00, LBB 1238/00 CIRCUIT DIAGRAM \PART5
7.19	LBB 1237/00, LBB 1238/00 PCB LAY-OUT \PART1
7.20	LBB 1237/00, LBB 1238/00 PCB LAY-OUT \PART2
7.21	LBB 1237/00, LBB 1238/00 PCB LAY-OUT \PART3

SERVICE DOCUMENTATION

4822 733 24416

## 1. CHAPTER 1. INTRODUCTION

#### 1.1. GENERAL

The SQ20 range of high performance audio mixing, pre-mixing, booster and system amplifiers have been designed for use in a wide variety of Public Address environments. Ease of operation, combined with good service-accessibility have been optimised in their design.

The total SQ20 range comprises:

LBB	1229/00				•	Tuner-unit
LBB	1230/00				_	Amplifier
LBB	1231/00					Amplifier
LBB	1232/00		60	Watt	Mixing	Amplifier
LBB	1233/00	1:	20	Watt	Mixing	Amplifier
LBB	1234/00		60	Watt	Booster	Amplifier
LBB	1235/00	1:	20	Watt	Booster	Amplifier
LBB	1237/00		60	Watt	System	Amplifier
	1238/00	1:	20	Watt	System	Amplifier
LBB	1239/00				Mountin	g-brackets

In this Manual the technical data, installation instructions, spare parts and diagrams of the complete SQ20 range as subscribed above are included, except the callstation(s). The LBB 9427/10, and the new colour-item LBB 9527/10, are described within an additional manual.

Since, for some chapters, information has already been published within the "Datasheets", we will refer to these sheets.

For the SQ20 range, several "Datasheets" are available, combined with this documentation as figures 2.1 upto and including 2.4.

The aim of this Service Manual is mainly to provide in a "Selected component" Second Line Service, because of the ease of install and maintain.

#### 1.2. THE SQ20 AMPLIFIER RANGE

See "Datasheets" . This range is enlarged with the SQ 20 - Cassette unit LBB 1228/00, and the Cassette player LBB 1228/50. The details of the LBB 1228/xx were not available at the moment this Service-manual was printed; the details will be published by a Service-Information.

#### 2. <u>TECHNICAL DATA</u>

See the "Datasheets", which are part of this service-manual, as figure 2.1 upto and including 2.4.

#### 3. INSTALLATION

#### - Opening the amplifier

Access may be gained to the mains transformer tappings; d.c. fuses; and internally mounted "slide switches", "flying leads" and wire links, by removing the four cross-headed screws (two on each side of the amplifier), and removing the top cover.

Care should be taken not to lose the toothed shake-proof washers which are fitted under the heads of the screws. These washers are required to electrically bond the top cover to the earthed chassis of the amplifier.

For safety reasons these washers must always be fitted when the amplifier is in use.

Note: Before removing the cover, disconnect the amplifier from the mains supply. For safety reasons, it is NOT sufficient just to switch off the amplifier!

#### 19" Rack Mounting

The range of SQ20 system amplifiers have been designed for both table-top, or 19" rack mounting. Two mounting brackets (LBB 1239/00) and their associated screws, can be ordered for rack mounting the unit.

To attach the mounting brackets, first remove the top cover as described.

Locate the two screw holes provided at both sides of the

SERVICE DOCUMENTATION

4822 733 24416

amplifier. Using the associated screws, firmly mount the brackets to the amplifier.

#### - Mains connections and earthing

The system amplifiers are supplied ready for use on 220 V a.c. mains. They are adjustable for use on 110 V, 127 V, 220V -230V and 240V by resoldering the brown wire onto the appropriate tag on the mains transformer (T), covered by a protective shield. Care should be taken to ensure that the wire is firmly soldered to the tag.

#### Note:

The amplifier must be tapped for the correct mains voltage, as described, before connecting it to the mains supply.

On delivery the amplifier is supplied with a 2m long 3-core mains lead, terminated at one end with a 2 pole mains plug with earth contacts, and at the other end with a C.E.E connector. In some countries it may be necessary to replace the mains plug with one of a local standard type. A replacement plug must be wired as follows:

Earth

- green/yellow

Neutral

- blue

Live

- brown

### WARNING!:

This amplifier must be powered via an earthed mains outlet .

A non restoring thermal fuse, located in the mains transformer, will disconnect the mains supply, should the mains transformer overheat.

## WARNING!:

This fusable link operates on the primary winding of the mains transformer, and although the mains indicator LED may be off the full mains supply voltage is still present inside the amplifier.

4822 733 24416

SERVICE DOCUMENTATION

#### 4 <u>CHECKING AND ADJUSTING</u>

See Instructions for use

NOTE:

when replacing the tuner-module of both System-amplifier-models LBB 1237/00 and LBB 1238/00 following only, should be done: adjusting the scale between 88 and 108 MHz. Since this amplifier has been delivered before the moment, this manual was printed, a Service-information "TIP: TI099PA063" has been released regarding these amplifier-models LBB 1237/00 and LBB 1238/00. A brief content of this Service-information-sheet is that "in some system-amplifiers, a tuned signal will be overruled by another stronger signal; corrective action is the change of resistor R971 (68kOhm) into 220kOhm. From serial-number 001361 (LBB 1237/00), and 001441 (LBB 1238/00) onwards, this action already has been implemented.

## 5 <u>CIRCUIT-DESCRIPTION</u>

These amplifiers are repaired at so-called "selected component level", consequently the description would normally be at component-level. Since the technique of the amplifiers is rather simple, it has been decided not to make a complete full-filled description at component-level. The knowledge of the average workshop-engineer should be at this level.

NOTE: Additional details, which are relevant for the following type-numbers:

## 5.1 DIFFERENCE BETWEEN THE SEVERAL OUTPUT-STAGE'S:

AMPLIFIER-MO	DDEL	30W	<u>60W</u>	120W	
MIXING- BOOSTER- SYSTEM-	LBB LBB LBB	1231/00	1232/00 1234/00 1237/00	1233/00 1235/00 1238/00	
ITEM		30W	60W	120W	
R150, R156				4,7Ω	
R155, R158		470Ω	1kΩ	1,5kΩ	
R149, R166 R144		$4,7k\Omega$	5,6kΩ	1,5kΩ 5,6kΩ	
C201		4700uF	6800uF	4700uF	
C207				4700uF	
F201		F 5A	F 8A	F 10A	
F202				F 10A	
F001		T 1A	T 1,6A	T 2,5A	
R501		330Ω	180Ω	$100\Omega$	ALL 5W

#### 6 SPARE-PARTS

#### General:

The spare-parts, as indicated, are so-called "selected components", which means that only a number of the used components have been selected to be a spare-part, in order to reduce the number of obsolesce-risk. This means that, if one cannot repair the unit by using one of the possible components, one normally has to replace the amplifier! The spare-parts are available from Philips Consumer Service.

The mentioned spare-parts, used within the several type's of the amplifier-range, are NOT listed as certain so-called 'pos.' - numbers, but as a type-number of the component, i.e. Q302 (transistor C458) is mentioned as "transistor C458 NPN with a 5322.. number", and NOT as "pos. Q302", with a 5322.. number.

No discrete components, like ordinary resistors and capacitors are mentioned, because of the assumption of the fact that one normally has components like these within a regular workshop.

NOTE:

some items within this listing are mentioned as a component with Spare-part-number 0000 000 000000; this means this item will be available as a Spare-part, however at the moment, this Documentation was finished, this item did not have a Philips Consumer Service code-number yet. This information will be added to the Service Documentation, by means of a Service-Information-Sheet (Documentation Change) as soon as the necessary information is available.

### 6.1 RECOMMENDED SPARE-PARTS TOTAL SQ 20 SERIES:

Main switch	5322	277	11136
Tuner PCB	5322	214	11157
Power Supply transformer (LBB 1229/1230/00)	5322	146	10331
Mains connector	5322	265	30876
Battery connector	5322	265	30875
Set handles	5322	498	50319
VU-Meter	5322	344	50118
Transistor C485 NPN	5322	130	62667
Transistor A673 PNP	4822	130	41412
Operational amplifier LF 353	5322	209	81395
Integrated circuit BA 6144	4822	209	73037
Integrated circuit NJM 386 D	5322	209	72458
Diode 1 N 60 Germanium	4822	130	80562
Diode 1 N4148 (BAW 62)	4822	130	30613
Power-transistor C3281	4822	130	60116
Operational amplifier LF 353	5322	209	81395
Integrated circuit BA 6144	4822	209	73037
Integrated circuit NJM 386 D	5322	209	72458
Operational amplifier LF 353	5322	209	81395
Operational amplifier LM 324	4822	209	80587
Pre-amplifier integrated circuit OQ 0703	5322	209	63972
Thermistor SDT 09	5322	116	30414
Mains transformer PT-SQ20-30W	5322	146	10329
Output transformer 30 W			10327
Mains transformer PT-SQ20-60W	5322	146	10332
Output transformer 60 W	5322	146	10333
Mains transformer PT-SQ20-120W	5322	146	10334
Output transformer 120 W			60332
Fan-motor	5322	361	10598
Tuner PCB (LBB 1229/1237/1238/00)	5322	214	11157
Fuses: F 0,5 A	4822	253	30017
T 0,5 A	4822	253	20014
T 1,0 A	4822	070	31002
T 1,6 A			31602
T 2,0 A	4822	253	30025
T 2,5 A	4822	070	32502
T 3,15 A	4822	070	33152
F 5,0 A	5322	253	40055
T 5,0 A			30029
F 8,0 A			40034
F 10 A	5322	253	54035

4822 733 24416

SERVICE DOCUMENTATION

#### 6.2 SPARE-PARTS listed per type-number:

#### 6.2.1 LBB 1229/00 SQ-20 TUNER-UNIT

Front panel	5322	447	50146
Knob	5322	414	30183
Main switch	5322	277	11136
Potentio-meter	5322	101	11138
Jack-plug	5322	265	20515
Phone jack	5322	267	10273
Fuse	5322	253	40055
Tuner PCB	5322	214	11157
Power Supply transformer	5322	146	10331
Mains connector	5322	265	30876
Battery connector	5322	265	30875
Set handles	5322	498	50319
VU-Meter	5322	344	50118
Tuner channel-selector switch	5322	210	10424
Loudspeaker	0000	000	00000
Potentiometer $100 \mathrm{k}\Omega$	0000	000	00000
Transistor C485 NPN	5322	130	62667
Transistor A673 PNP	4822	130	41412
Operational amplifier LF 353	5322	209	81395
Integrated circuit BA 6144	4822	209	73037
Integrated circuit NJM 386 D	5322	209	72458
Diode 1 N 60 Germanium	4822	130	80562
Diode 1 N4148 (BAW 62)	4822	130	30613

# 6.2.2 LBB 1230/00 SQ-20 PRE-MIXING AMPLIFIER

Front panel	5322	447	50144
Knob	5322	414	30152
Knob	5322	414	30183
Main switch	5322	277	11136
Potentiometer RK163111A152	5322	101	11139
Potentiometer RK163111R376	5322	101	11138
Jack plug PJ-202NP	5322	265	20515
Phone Jack HTJ064-03	5322	267	10273
Fuses: F 0,5 A	4822	253	30017
T 1 A	4822	070	31002
T 0,5 A	4822	253	20014
DIN 5 pol DJ-005	5322	267	10272
Mains transformer PT SQ.20-PM	5322	146	10331
Mains connector 4300-1002	5322	265	30876
Battery-connection (incl. fuse) DT55A02W-02			
Handle, 2 pcs. incl. screws	5322	498	50319
Transistor C485 NPN			62667
Transistor A673 PNP			41412
			81395
Operational amplifier LF 353			73037
Integrated circuit BA 6144			72458
Integrated circuit NJM 386 D			
Diode 1 N 60 Germanium			80562
Diode 1 N4148 (BAW 62)	4822	130	30613

### 6.2.3 SPARE PARTS LBB 1231/00 SQ-20 30 W MIXING AMPLIFIER

Front panel	5322	447	50144
Knob 18			30152
Knob 14			30183
Main switch		. — .	11136
Potentiometer A152			11139
Potentiometer R376			11138
Jack plug			20515
5P DIN			10272
Phone Jack			10272
			40055
Fuses: F 5,0 A			30025
T 2,0 A			310023
T 1,0 A			
Mains transformer PT-SQ20-30W			10329
Mains connector			30876
Battery conn. incl. fuse			30875
Thermistor SDT 09			30414
Output transformer 30 W			10327
Handle 2pcs. incl. screws			50319
Made-and-lock 6 pol.			40995
Transistor C485 NPN			62667
Transistor A673 PNP			41412
Transistor D613E NPN			10328
Transistor D667 NPN			10329
Power-transistor C3281	4822	130	60116
Pre-amplifier integrated circuit OQ 0703	5322	209	63972
Operational amplifier LF 353	5322	209	81395
Integrated circuit BA 6144	4822	209	73037
Integrated circuit NJM 386 D	5322	209	72458
Diode 1 N 60 Germanium	4822	130	80562
Diode D 1502	5322	130	82533
Diode 1 N4148 (BAW 62)	4822	130	30613

# 6.2.4 SPARE PARTS LBB 1232/00 SQ-20 60 W MIXING AMPLIFIER

Front panel	5322	447	50144
Knob 18	5322	414	30152
Knob 14	5322	414	30183
Main switch	5322	277	11136
Potentiometer A152	5322	101	11139
Potentiometer R376	5322	101	11138
Jack plug	5322	265	20515
Phone JACK	5322	267	10273
5P DIN	5322	267	10272
Fuses: F 8,0 A	5322	253	40034
T 3,15 A	4822	070	33152
T 1,6 A	4822	070	31602
Mains transformer 60 W	5322	146	10332
Mains connector	5322	265	30876
Battery conn. incl. fuse	5322	265	30875
Thermistor SDT 09	5322	116	30414
Output transformer 60 W	5322	146	10333
Handle 2pcs. incl. screws	5322	498	50319
Made-and-lock 6 pol.	5322	267	40995
Transistor C485 NPN	5322	130	62667
Transistor A673 PNP	4822	130	41412
Transistor D613E NPN	5322	146	10328
Transistor D667 NPN			10329
Power-transistor C3281	4822	130	60116
Pre-amplifier integrated circuit OQ 0703	5322	209	63972
Operational amplifier LF 353	5322	209	81395
Integrated circuit BA 6144	4822	209	73037
Integrated circuit NJM 386 D	5322	209	72458
Diode 1 N 60 Germanium	4822	130	80562
Diode D 1502	5322	130	82533
Diode 1 N4148 (BAW 62)	4822	130	30613

#### 6.2.5 SPARE PARTS LBB 1233/00 SQ-20 120 W MIXING AMPLIFIER

Front panel	5322	447	50144
Knob 18	5322	414	30152
Knob 14	5322	414	30183
Main switch	5322	277	11136
Potentiometer	5322	101	11139
Potentiometer Switch	5322	101	11138
Jack plug	5322	265	20515
Phone jack			10273
5P DIN			10272
Fuses: F 10 A			54035
T 5,0 A			30029
T 2,5 A	4822	070	32502
Mains transformer 120 W	5322	146	10334
Mains connector	5322	265	30876
Battery conn. incl. fuse	5322	265	30875
Fan-motor			10598
Thermistor SDT 09	5322	116	30414
Output transformer 120 W	5322	140	60332
Handle 2pcs. incl. screws			50319
Made-and-lock 6 pol.	5322	267	40995
Transistor C485 NPN			62667
Transistor A673 PNP			41412
Transistor D613E NPN			10328
Transistor D667 NPN	5322	146	10329
Power-transistor C3281	4822	130	60116
Pre-amplifier integrated circuit 0Q 0703			63972
Operational amplifier LF 353	5322	209	81395
Integrated circuit BA 6144	4822	209	73037
Integrated circuit NJM 386 D			72458
Diode 1 N 60 Germanium	4822	130	80562
Diode D 1502	5322	130	82533
Diode 1 N4148 (BAW 62)	4822	130	30613

# 6.2.6 SPARE PARTS LBB 1234/00 SQ-20 60 W BOOSTER AMPLIFIER

Front panel	5322	447	50143
Knob 18	5322	414	30152
Jack-plug	5322	265	20515
Phone Jack	5322	267	10273
5P DIN	5322	267	10272
Main switch	5322	277	11136
Handle (2 pcs. incl. screws)	5322	498	50319
Made-and-lock 6 pol.	5322	267	40995
Mains connector, incl fuse	5322	265	30876
Battery conn. incl. fuse	5322	265	30875
Fuses: F 8,0 A	5322	253	40034
T 3,15 A	4822	070	33152
T 1,6 A	4822	070	31602
Mains transformer 60 W	5322	146	10332
Output transformer 60 W	5322	146	10333
Thermistor SDT 09	5322	116	30414
Potentiometer	5322	101	11138
Transistor C485 NPN	5322	130	62667
Transistor A673 PNP	4822	130	41412
Transistor D613E NPN	5322	146	10328
Transistor D667 NPN	5322	146	10329
Power-transistor C3281	4822	130	60116
Operational amplifier LF 353	5322	209	81395
Integrated circuit BA 6144	4822	209	73037
Integrated circuit NJM 386 D	5322	209	72458
Diode 1 N 60 Germanium	4822	130	80562
Diode D 1502	5322	130	82533
Diode 1 N4148 (BAW 62)	4822	130	30613

#### 6.2.7 SPARE PARTS LBB 1235/00 SQ-20 120 W BOOSTER AMPLIFIER

Front panel	5322	1.1.7	50143
Knob 18			30152
		. — .	20515
Jack-plug Phone Jack			10273
5P DIN			10272
Main switch			11136
Handle (2 pcs. incl. screws)			50319
Made-and-lock 6 pol.			40995
Mains connector, incl fuse			30876
Battery conn. incl. fuse	5322	265	30875
Fuses: F 10 A	5322	253	54035
T 5,0 A	4833	253	30029
T 2,5 A	4822	070	32502
Fan-motor	5322	361	10598
Mains transformer 120 W	5322	146	10334
Output transformer 120 W	5322	140	60332
Thermistor SDT 09	5322	116	30414
Potentiometer	5322	101	11138
Transistor C485 NPN	5322	130	62667
Transistor A673 PNP	4822	130	41412
Transistor D613E NPN	5322	146	10328
Transistor D667 NPN	5322	146	10329
Power-transistor C3281	4822	130	60116
Operational amplifier LF 353	5322	209	81395
Integrated circuit BA 6144	4822	209	73037
Integrated circuit NJM 386 D			72458
Diode 1 N 60 Germanium	4822	130	80562
Diode D 1502			82533
Diode 1 N4148 (BAW 62)			30613
			50015

#### 6.2.8 SPARE PARTS LBB 1237/00 SQ-20 60 W SYSTEM AMPLIFIER

Front panel	5322	447	50145
Knob 18	5322	414	30152
Knob 14	5322	414	30183
Knob 10 x 7	5322	414	20393
Phone Jack	5322	267	10273
Jack-plug 2 pol.	5322	265	20515
Jack 4 pol.	5322	265	20517
DIN 5 pol.	5322	267	10272
DIN 6 pol.	5322	267	10275
Main switch	5322	277	11136
Handle (2 pcs. incl. screws)	5322	498	50319
Made-and-lock 9 pol.	5322	267	40999
Made-and-lock 12 pol.	5322	267	41001
Mains connector, incl fuse	5322	265	30876
Fuses: F 8,0 A	5322	253	40034
T 3,15 A	4822	070	33152
T 1,6 A	4822	070	31602
Mains transformer 60 W	5322	146	10332
Output transformer 60 W	5322	146	10333
Tuner channel selector	5322	210	10424
Battery conn. (incl. fuse)			30875
Moving coil-meter	5322	344	50118
Relais 2 pol.	5322	280	20483
Relais 4 pol.	5322	280	20484
Potentiometer A152	5322	101	11139
Potentiometer A376	5322	101	11144
Thermistor SDT 09	5322	116	30414
Zone switch 2 channel			20512
Switch tuner/tape	5322	277	21507
Transistor C485 NPN	5322	130	62667
Transistor A673 PNP	4822	130	41412
Transistor D613E NPN			10328
Transistor D667 NPN	5322	146	10329
Power-transistor C3281			60116
Pre-amplifier integrated circuit OQ 0703			63972
Operational amplifier LF 353			81395
Operational amplifier LM 324			80587
Integrated circuit BA 6144			73037
Integrated circuit NJM 386 D	5322	209	72458

4822 733 24416

SERVICE DOCUMENTATION

# SPARE PARTS LBB 1237/00 SQ-20 60 W SYSTEM AMPLIFIER (Cont'd)

Diode 1 N 60 Germanium	4822 130 80562
Diode D 810	5322 130 82564
Diode D 1502	5322 130 82533
Diode 1 N4148 (BAW 62)	4822 130 30613
Tunermodule , (incl. conn.)	5322 214 11157
Aerial plug assy (incl. filling pcs.)	5322 264 30317

## 6.2.9 SPARE PARTS LBB 1238/00 SQ-20 120 W SYSTEM AMPLIFIER

Front panel	5322	447	50145
Knob 18	5322	414	30152
Knob 14	5322	414	30183
Knob 10 x 7	5322	414	20393
Jack-plug	5322	265	20515
Jack	5322	265	20517
DIN 5 pol.	 5322	267	10272
DIN 6 pol.	5322	267	10275
Main switch	5322	277	11136
Handle (2 pcs. incl. screws)	5322	498	50319
Made-and-lock 9 pol.	5322	267	40999
Made-and-lock 12 pol.	5322	267	41001
Mains connector, incl fuse	5322	265	30876
Fuses: F 10 A	5322	253	54035
T 5,0 A	4822	253	30029
T 2,5 A	4822	070	32502
Fan-motor	5322	361	10598
Mains transformer 120 W	5322	146	10334
Output transformer 120 W	5322	140	60332
Tuner channel selector	5322	210	10424
Battery conn. (incl. fuse)	5322	265	30875
Moving coil-meter	5322	344	50118
Relais 2 pol.	5322	280	20483
Relais 4 pol.	5322	280	20484
Potentiometer A152	5322	101	11139
Potentiometer A376	5322	101	11144

# SPARE PARTS LBB 1238/00 SQ-20 120 W SYSTEM AMPLIFIER (Cont'd)

Thermistor SDT 09	5322 116 30414	
Zone switch 2 channel	5322 276 20512	
Switch tuner/tape	5322 277 21507	
Transistor C485 NPN	5322 130 62667	
Transistor A673 PNP	4822 130 41412	
Transistor D613E NPN	5322 146 10328	
Transistor D667 NPN	5322 146 10329	
Power-transistor C3281	4822 130 60116	
Pre-amplifier integrated circuit OQ 0703	5322 209 63972	
Operational amplifier LF 353	5322 209 81395	
Operational amplifier LM 324	4822 209 80587	
Integrated circuit BA 6144	4822 209 73037	
Integrated circuit NJM 386 D	5322 209 72458	
Diode 1 N 60 Germanium	4822 130 80562	
Diode D 810	5322 130 82564	
Diode D 1502	5322 130 82533	
Diode 1 N4148 (BAW 62)	4822 130 30613	
Tunermodule , (incl. conn.)	5322 214 11157	
Aerial plug assy (incl. filling pcs.)	5322 264 30317	